SCOPE OF WORK

ARCHITECTURAL/ENGINEERING and FINAL DESIGN

Airport Traffic Control Tower (ATCT) and Administrative Base Building

Tucson International Airport

Tucson, Arizona

March 7, 2012

U.S. Department of Transportation
Federal Aviation Administration

Federal Aviation Administration

“Expect Excellence”

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1. INTRODUCTION

The Federal Aviation Administration (FAA) intends to replace the existing Airport Traffic Control Tower (ATCT) at Tucson International Airport (TUS) in Tucson, Arizona. The air traffic operations count for Tucson peaked in 2006 at nearly 282,000. Since the peak, operations numbers have been in decline and are projected at slightly more than 166,000 for 2012.

The A/E shall design an Intermediate Activity Level (IAL) ATCT, and an adjacent base building on a site identified as site 16 in the FAA ATCT Site Survey Report. The design shall be based on the FAA standard designs found on the FAA KSN site. The ATCT cab shall be based on the 550 square foot IAL four column option, and the base building shall be based on the standard 13,000 square foot administrative base building.

The new facilities will provide state-of-the-art air traffic services well into the 21st century. To complete the design phase of this project, the FAA will need to procure the services of an architectural/engineering (A/E) firm.

2. SCOPE

The FAA will competitively bid this project. The A/E firms will be required to submit a proposal with four sections addressing the following areas: technical, schedule, cost, and quality (customer feedback). The proposal must conform to the requirements of the Request for Proposal (RFP), and this SOW.

The proposals from each prospective vendor will be evaluated by FAA utilizing a qualitative ranking system. All sections of the proposal will be given equal weight. If the qualitative evaluation process results in two or more of the highest ranked firms with equal or similar rankings, then the price proposals can be used to award the final contract.

After contract award, the FAA Contracting Officer will issue a Notice-to-Proceed (NTP). Immediately upon receipt of the NTP, the A/E shall begin the engineering work and schedule a project kickoff meeting. The kickoff meeting will be held in the Tucson area at the Airport Conference room or a hotel meeting room. The A/E firm will fund all meeting expenses with the exception of the government attendees' travel. The airport conference room is an acceptable location and if a hotel is chosen, the location must be approved by the FAA Contracting Officer in advance. A known acceptable hotel is the Starr Pass Marriott.

The A/E will have 290 calendar days from NTP to complete the work. The design shall be submitted to the FAA for review at the Project Planning Document (PPD), 35%, 70%, 95% and 100% stages. After comments from the 100% review have been incorporated, the final design shall be submitted to FAA. All deliverables shall be final and complete at the end of the performance time. The FAA will require 30 days to review and issue comments at each of the review stages. The time required for review is considered part of the 290-calendar day performance time; therefore, the A/E should proceed with the design during the review periods to the extent possible. At each review phase, the FAA Project Engineer will assemble the comments and send a copy to the A/E firm via electronic mail. Shortly after receiving the comments, the A/E shall host a design review meeting. The meeting after the submission of the PPD will be held at the same location as the kickoff meeting. If the contractor wishes to change the location, written approval by the FAA CO is required, in advance. Conference expenses will be covered by the A/E just as they were with the kickoff meeting. Subsequent meetings will be held at the FAA Regional Office in Hawthorne CA. The Regional Office is a secure building and all contractor employees will be required to possess a valid driver's license and contractor badge before entering the building. A/E employees will be granted visitor access and must have a FAA escort. The contractor will ensure attendance by its project manager and lead engineer for each discipline at all design reviews. Participation by teleconference is not acceptable. The purpose of all design review meetings is to discuss the comments and their disposition.

All work under this contract shall be performed in accordance with this SOW, technical input from the FAA, model building codes, FAA design orders and standards, guidelines, and local authorities having jurisdiction. The A/E shall furnish sufficient skilled technical, supervisory, and administrative personnel to ensure the expeditious completion of the work specified herein within the allotted time frames.

Only the FAA Contracting Officer can make contract modifications. To facilitate the progress of the design effort, coordination of change issues may be initiated with the FAA Project Engineer; however, all contract changes shall be issued by written modification from the FAA Contracting Officer.

The final deliverables under this contract shall be bid-ready drawings and specifications that are thorough, logical, technically sound, accurate, and provide sufficient detail to allow construction of all aspects of the project. All drafting shall be completed in a professional manner in accordance with FAA and industry standards. The drawings shall be arranged in a logical sequence and shall be readily interpreted. The A/E shall submit all final design calculations, a construction cost estimate, and other deliverables as specified herein.

This SOW will require civil, architectural, structural, mechanical, fire protection, electrical, and electronics engineering disciplines as well as project management, drafters, cost estimators, specification writers, interior designers, and administrative personnel. This SOW will also require LEED certification, land surveying, geotechnical subsurface investigation, soil analysis, security/blast design, wind tunnel testing, and electrical short circuit analysis and protective device coordination calculations. Each A/E firm shall clearly identify which disciplines and/or services, if any, will be subcontracted. A/E firms should also identify and discuss their experience with ATCT design, high-rise structure design, blast design and mitigation, progressive collapse prevention, and utilization of wind tunnel test results. Specific engineering and/or construction experience in the Tucson, AZ area should be noted as well.

At the conclusion of the design phase of this project, the entire design including all engineering drawings, specifications, reports, and studies shall become the property of the FAA. The FAA may elect to utilize all, or a portion, of this design at other locations as they see fit; however, the A/E will be released from any liability/responsibility for the design beyond Tucson.

3. TECHNICAL PROPOSAL REQUIREMENTS

Proposals shall not exceed 50 single-sided pages. Each page shall have a minimum of one inch margins on all four sides, and may be single-spaced or double-spaced at the discretion of the A/E firm. Spacing can be intermixed to achieve maximum readability. Each proposal shall utilize a size 12 Arial font. All pages shall be standard 8½ by 11-inch sheets, and bound in a 1-inch thick, three-ring binder. The binder cover shall have a cover page/title sheet that identifies the company name. Also, each proposal shall have a table of contents. Neither the cover/title page nor the table of contents will count against the maximum number of pages. Each page after the table of contents shall have a page number. Any proposal that does not comply with these requirements will be excluded from evaluation.

Each proposal must address each of the evaluation factors below. Of the evaluation factors below, the <u>Design Team Members and Key Personnel</u> and <u>FAA Experience and Performance</u> are the most important, <u>Company History</u> and <u>Similar Experience and Performance,</u> and <u>Schedule</u> are important, and <u>Subcontracted Work</u> and <u>Quality Control Plan</u> are less important.

<u>Design Team Members and Key Personnel</u> - Identify the design team members (by name and title) that will hold key positions under this contract. Include resumes for all design team members and key personnel. Positions marked with an "*" shall be in-house and not subcontractors. As a minimum, each proposal shall include information for the following positions.

Project Manager*
Senior Architect*
Senior Civil Engineer*
Senior Structural Engineer*
Senior Mechanical Engineer*
Senior Electrical Engineer*
Senior Fire Protection Engineer
Senior Electronics Engineer
Senior Environmental Engineer
Interior Designer
Senior Cost Estimator
Drafting Manager
Quality Control Manager*
LEED Certified Professional*
Blast Analysis Engineer

If the successful A/E firm intends to substitute design team members in key positions at any time or for any reason, they shall immediately notify the contracting officer. The A/E shall submit a resume and qualifications of the substitute candidate for review by the FAA. If the FAA deems the substitute to be unacceptable, the A/E must submit a resume and qualifications for another candidate until a suitable replacement is approved.

<u>FAA Experience and Performance</u> – List all ATCT experience completed by the company in the past five years, as well as all current on-going projects. Include the project name,

location, a brief description of the scope, and the construction cost. This experience must include a project that has been awarded to the A/E firm. Projects that were bid but not awarded can be included but completed design contracts are required. Projects bid but not awarded shall include a customer written narrative on why the project was not awarded.

Provide the names of design team members and key personnel that held, or are holding, positions for the projects listed. Also, provide information for subcontracted work if applicable, including the name of the company, the service and/or discipline(s) provided, and the names of key personnel/design team members. Include the names and telephone numbers of references for each project that can be contacted to validate the A/E's information and performance.

Company History – Each A/E shall include a brief company history. It shall be no more than one page, and shall include pertinent information such as how long the company has been in business, number of offices it has and where they are located, total number of employees, range of job categories/disciplines within the company, the type and size of typical projects and where they are located, and other information the A/E firm deems relevant.

Similar Experience and Performance – List any experience for projects of similar scope and magnitude completed within the past five years. Include the project name, location, a brief description the scope, and the construction cost. Include pertinent project dates such as contract award and design completion. If construction award dates and construction completion dates are available include those as well. Cost estimate total and construction award amount are also helpful in determining the quality of estimates the A/E has a history of providing.

Provide the names of design team members and key personnel that held, or are holding, positions for the projects listed. Also, provide information for subcontracted work if applicable, including the name of the company, the service and/or discipline(s) provided, and the names of key personnel/design team members. Include the names and telephone numbers of references for each project that can be contacted to validate the A/E's information and performance.

Schedule - Show major activities (milestones) including, as a minimum, Notice-To-Proceed (NTP), kickoff meeting, required submittals, FAA review periods (30 days for each review cycle), and final deliverables. For comparison purposes, each A/E shall assume an NTP date of April 2, 2012.

Subcontracted Work: Subcontracting portions (Senior Fire Protection Engineer, Senior Electronics Engineer, Senior Environmental Engineer, Interior Designer, Senior Cost Estimator, and Drafting Manager) of the work is allowed; however it should be noted that FAA may view excessive subcontracting as higher risk. If portions of the work will be subcontracted, the A/E shall clearly identify the number of subcontractors it intends to use, the work that will be subcontracted, and the name of the company providing the different discipline(s)/services. Include pertinent data for each subcontractor such as a brief company history, and resumes for the subcontractor's designers and/or key personnel.

One known acceptable source for blast analysis is included here for the A/E consideration:

ARA Consultants (601) 638-5401
119 Monument Place
Vicksburg, MS 39180

Quality Control Plan – Briefly describe the company's quality control (QC) plan and how it will be implemented on this project. If subcontracting portions of the work, the A/E shall address if/how the subcontractors will be expected to comply with the QC plan. The QC plan description and discussion shall not exceed two pages.

4. BACKGROUND INFORMATION AND GENERAL REQUIREMENTS

A siting study was completed by the FAA in 2011 to determine the optimum location for the new ATCT at Tucson International Airport based on a variety of sites that were available at the time. The recommendation of the Final Siting Report was to construct the new facility on a site identified as "Site 16". The site is shown in the Google Earth photo:

The site is owned by the Tucson International Airport Authority (TIAA) and the FAA has/will ask the owner to reserve the following area shown in red:

Site 16 is within the boundaries of the TIAA superfund site as established by the EPA in 1983 due to historic unregulated disposal of industrial chemicals.

The FAA has completed a phase I and phase II Environmental Due Diligence Audit (EDDA). The phase I EDDA is a paper study that does not require on site samples or analysis. The conclusion of the phase I EDDA identified the likely presence of ground water contaminated with volatile organic compounds underlying the site as a Recognized Environmental Condition (REC). The phase II EDAA was commissioned for further study which was completed in April 2011.

The phase II EDDA included soil gas and surface soil samples in an attempt to determine if the site is impacted by underlying ground water contamination or by contaminated surface soil. The risk that contaminants potentially present in the ground water could volitalize to outdoor and/or indoor air in concentrations that would pose a risk to either construction workers or future outdoor workers and building occupants was of particular interest.

Eighteen Volatile Organic Compounds (VOCs) were detected in the soil gas samples but no VOCs were detected in any of the surface soil samples. The contaminants present were consistent with those found on surrounding properties within the TIAA superfund site.

The conclusion of the phase II EDDA is that both cancer and non-cancer risks to construction workers and future indoor and outdoor workers at Site 16 are within acceptable limits. Due to the exposure assumptions used, this risk evaluation is conservative. The phase II EDDA will be supplied upon request.

The A+E shall engineer, design, and incorporate into the plans and specifications an under floor slab venting system to eliminate the build up of any hazardous/toxic vapors. In addition the A+E shall include in the construction documents the requirement for a licensed industrial hygienist to monitor excavation work. The A+E shall review the FAA provided EDDA for the specific hazards to be mitigated.

Design criteria for this project include the materials and guidance specified herein, as well as the current editions of the International Building Code (IBC), Minimum Design Loads for Buildings and Other Structures (ASCE 7-05), National Electrical Code (NEC), Life Safety Code (NFPA (101), International Mechanical Code (IMC), International Plumbing Code (IPC), National Fire Protection Agency (NFPA) Codes and Standards, Energy Code (IECC2000), ASHRAE, Americans with Disabilities Act (ADA), and applicable FAA Orders and Standards. FAA publications will have first priority; however, if a conflict arises between publications, the A/E shall submit a request for resolution to the FAA Project Engineer. The FAA Project Engineer will attempt to satisfactorily resolve the conflict within 15 calendar days. If the A/E fails to meet the requirements of the technical criteria contained, or referred to, herein, the A/E will be required to correct the design to meet those requirements without additional expense to the FAA. Any questions or problems encountered by the A/E in following the criteria should be submitted to the FAA Contracting Officer for resolution.

In addition to the publications referenced above, the A/E shall comply with state and local government agencies having jurisdiction. If conflicts arise between the state or local requirements, and any referenced publication, the A/E shall notify the FAA Contracting Officer and FAA Project Engineer for resolution.

Although not a complete list of applicable FAA Standards and Orders, the FAA Project Engineer can furnish the following applicable documents to the successful A/E bidder upon request:

FAA Order 6000.35	*Use of Brand Name or Equal in FAA Construction Specifications*
FAA Order 6950.27	*Short Circuit Analysis and Protective Device Coordination Study*
FAA Order 1600.69B	*FAA Facility Security Management Program (contractor will be required to sign a Non-Disclosure Agreement)*
FAA Order 6000.36A	*Communications Diversity*
FAA-C-1217f	*Interior Electrical Work*

FAA-STD-032	*Design Standards for National Airspace System Physical Facilities*
FAA-STD-033	*Design Standards for Energy Management in NAS Physical Facilities*
FAA-STD-019e	*Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities*
FAA-STD-1391b	*Installation and Splicing of Underground Cables*
FAA-AC 70/7460-1J	*Obstruction Marking and Lighting*
FAA-STD-002f	*US DOT FAA Standard Engineering Drawing Preparation & Support*
29 CFR 1960.20	*Alternate Standard for Fire Safety in ATCT's and FAA 29 CFR 1960.20 Enhanced Checklist*

Quality Assurance: The responsibility of the A/E for checking and coordinating all drawings and specifications cannot be overemphasized. The A/E is responsible for producing complete, competent, properly coordinated, and thoroughly checked design documents in accordance with the agreed schedules. A final, independent, thorough check by the A/E shall be accomplished for all plans and specifications, and other required data prior to any scheduled FAA review. The A/E shall submit a fully coordinated check print set and quality control checklist showing the A/E's comprehensive review effort. Designs containing numerous drafting, typing, and/or referencing errors will be returned to the A/E for checking and resubmittal. A constructability review may be conducted by a construction contractor hired by FAA. The A/E shall review and incorporate the constructability comments at no additional cost.

Definition of days: All schedule dates discussed herein are calendar days. Submittals are due to the FAA Project Engineer by 12:00 PM, Pacific Time on the date indicated. The A/E shall fully address and resolve all review comments from previous submissions, and include the resolved review comments with the subsequent submittals.

Quality Control: The A/E shall have a logical and functional quality control program to minimize errors and/or deficiencies. The A/E shall perform independent technical reviews and correct all errors and deficiencies in the design documents prior to submitting them to FAA. These reviews shall be accomplished by persons not directly involved in the design. The final check prints of the drawings shall reflect a complete review by yellowing out correct items and making corrections in red. This set of check prints shall be provided to FAA if requested.

The A/E shall prepare a submittal register describing all construction submittals. This shall include a description of submittal requirements such as: samples, certifications, MSDS, Professional Engineer's stamp, drawings, catalog cuts, etc.

The designs provided by the A/E at the various review stages will be reviewed by FAA users, and/or other Government representatives for conformance with the contract requirements. Government comments will be tabulated by the FAA Project Engineer and submitted to the

A/E. The A/E shall respond to all comments by compliance, or by providing an acceptable explanation of noncompliance. The A/E shall indicate the nature and location of the disposition next to the comment.

The contractual obligation of the A/E to provide complete, well coordinated, and error free documents has far reaching consequences. In the event of subsequent damage to the Government (facilities, equipment, or personnel) resulting from negligent performance of any of the services to be furnished under this contract, the A/E will be held liable for such damages. The Government's review in no way relieves the A/E of these contractual responsibilities. For this reason, an effective quality control plan is very important.

Trade Names and Proprietary Items: The use of trade names or proprietary items on drawings or in specifications shall be avoided. Also, the A/E shall not draft specification sections by adopting a manufacturer's specification or description of a particular commercial article.

Construction Cost Estimate: The construction cost estimate shall be in Excel format and submitted with the concept or early preliminary submittals shall be as accurate as possible based on the design accomplished at that time. These estimates will be used for programming and budgeting purposes. The A/E shall design the project within the programmed funds. If, at any time, it becomes apparent that the project cost will exceed the programmed amount, the A/E shall notify the Contracting Officer and FAA Project Engineer immediately. The A/E shall suggest cost saving measures. These cost saving measures are considered part of the basic design and not value engineering (VE) studies.

The construction cost estimate shall be supported by a complete written takeoff which is organized and correlated with the design documents. Price quotes shall also be documented with names, telephone numbers, and product cuts. The cost estimate shall be subtotaled at the end with provisions made for the prime contractor's overhead, profit, bonding, and applicable location factor(s). Overhead, profit, bonding and location factor provisions shall also be included for subcontractors as appropriate.

Demolition Cost Estimate: The A/E shall submit a cost estimate for the demolition of the old Engine Generator structure, and restoration of the site back to its original condition. The demolition cost estimate shall be submitted to the FAA project engineer along with the 70% design submittal for the new ATCT and base building, and shall include shipping costs for the Engine Generator and associated components to a location designated by the FAA.

Life Cycle Costs: The A/E is responsible for designing the facility for the lowest total life cycle cost including construction cost and accumulated maintenance and operating cost for the duration of the design life, which is assumed to be 25 years. This analysis shall be accomplished by providing a minimum of three options, and with life cycle cost analysis completed for all three alternatives. Construction documents submitted by the A/E shall provide a complete, useable, and maintainable facility.

Safety: All work shall include the necessary features required to produce a facility in which employee safety has been incorporated so as to conform to the established safety codes and regulations. Particular attention shall be given to such safety features as maintenance clearances for mechanical and electrical equipment, equipment guards, head clearances, handrails, access hatches, ladder cages, fixed ladders, and non-slip treads. All projects shall meet the requirements of OSHA Standards, and other applicable user/agency safety standards.

Austerity in Design: All design and construction shall be performed consistent with the principals of maximum economy. Materials and finishes shall result in minimum first costs and maintenance. Efforts shall be made to produce aesthetically pleasing structures with due consideration for economy of design and without resorting to purely decorative features. Energy conservation, "green" concepts, and value engineering (VE) are also important design considerations.

Leadership in Energy and Environmental Design (LEED): The A/E shall design with the intent of achieving Silver Certification. A registered project checklist showing the pre-certification estimates shall be provided with design deliverables beginning with the 35% and continuing through the final submittal.

Permitting: The A/E shall make all necessary arrangements and/or provide pertinent data for FAA to obtain any required permits for the project including utility services. If necessary, obtain permits for storm water discharge, sanitary sewer, and potable/fire water from the authority having jurisdiction. The A/E shall make arrangements for other appropriate permits that may include, but not necessarily be limited to, elevator life safety monitoring permits, fire department permits, fire alarm monitoring permits, noise permits, and general building permits.

Please note in accordance with 40 USC 3312 paragraph (g) which states "The Government and its contractors shall not be required to pay any amount for any action a State or political subdivision of a State takes to carry out this section, including reviewing plans, carrying out on-site inspections, issuing building permits, and making recommendations."

Federal, State, and Local Pollution Abatement Criteria and Environmental Permits: To avoid wasted effort, the A/E shall contact permitting agencies early in the design process. The A/E shall ensure that the project is in full compliance with the requirements of all Federal, state, and local clean air, clean water, water rights, resource recovery, and solid waste disposal standards and the Federal Endangered Species Act. All applicable standards and criteria shall be obtained and reviewed by the A/E.

Site Investigations: The A/E shall conduct site investigations to complete the project documentation and to determine the full parameters by which the design will be accomplished. Documentation shall include subsurface and geotechnical investigations, as well as existing utility and topographic surveys.

Geotechnical Investigations: The geotechnical investigations and reports are the responsibility of the A/E. Adequate information shall be obtained for use by designers of structures, grading, drainage, and other features.

Studies: The geotechnical studies and soil analyses shall include soil consolidation swell testing, bearing capacity, soil resistivity, soils classifications, and any other analyses deemed necessary by the A/E. The geotechnical studies/analysis shall include foundation and pavement design recommendations.

Communications Routing: The FAA has validated a requirement for communications diversity at the ATCT. A/E shall design ductbank and all communications infrastructure in accordance with FAA order 6000.36A.

Use of existing, FAA owned ductbank is permitted. The A/E shall prepare an inventory of the existing duct banks and their identifications, also including percent available space and submit it to the FAA Project Engineer.

Surveying: All surveying shall be accomplished by, or under the supervision of, a professional land surveyor holding a current license issued by the State of Arizona. Original field notes, computations, aerial negatives, photographs, and maps, without alteration, shall be furnished to the FAA when the project is completed. A legal description of the site shall be provided as soon as possible but no later than the 35% submittal and shall be included on the civil drawings. Topographical surveys shall be provided for construction purposes.

Architectural Rendering: The A/E shall develop a water-color architectural rendering of the new ATCT and Base Building once the building elevations, finishes, and colors have been finalized. A preliminary half-sized rendering shall be submitted for review prior to generating the final version. The final rendering shall be approximately 500 square inches in size, matted, and framed. In addition to the original, the A/E shall provide five full-size and twenty 8 x 10 inch color photographs of the rendering. All of the full-size and 8 x 10 inch photos shall be matted and framed. Glass in frame shall contain UV filtering and anti-reflective coatings.

Drafting: The drawings generated for this project shall be computer-drawn on D-sized sheets. Unless approved otherwise, all floor plans and details shall be drawn to scale. The drawings shall be generated with Microstation v8 in .dgn format. All drawings shall be compliant with FAA-STD-002g. The final drawing files shall be submitted on CD ROM or DVD.

The FAA is committed to implementing Building Information Modeling (BIM) moving from a two-dimensional workflow to a three-dimensional information model based workflow. The attached BIM Requirements provide detail on the expectations for this project.

The A/E shall coordinate with the FAA Project Engineer to acquire the appropriate drawing border with the FAA title block in the bottom right corner of each sheet. The A/E may add their company emblem on the drawings just to the left of the FAA title block. FAA will provide drawing numbers and an acceptable numbering system to be used for this project.

Stamping of Drawings: An architect's or professional engineer's seal shall be furnished on all drawings and calculations. All drawings shall be stamped and signed by an architect or professional engineer registered in the State of Arizona.

Specification Format: The successful A/E will be provided with the generic Standard Design specifications in MasterSpec format. The A/E will be responsible for editing each section of the specification to accurately reflect the project requirements. The A/E shall coordinate with the FAA Project Engineer for a specification number and date. The final project specifications shall be submitted to the FAA in Microsoft Word 2003 (2010 may be an option since the government is in the process of updating) format.

Initial Project Kickoff Meeting: Within three weeks after the NTP is issued for this contract, the FAA will meet with the successful bidder's design team in Tucson Arizona to "kickoff" the project, establish points-of-contact with the FAA and TIAA, discuss pertinent project information, and perform initial site inspections. The kick-off meeting will be held at the TIAA conference room or a hotel conference room and is expected to require a full week. The A/E will fund conference expenses. At least two days will be reserved for face-to-face meetings between the A/E's design team and the FAA, while the remainder of the time can be used for meetings with utility companies, the TIAA engineering offices, the TIAA Fire Department, and other entities to collect pertinent engineering data. Other site visits and meetings can be included as the A/E deems necessary. These meetings shall be incorporated into the A/E's price proposal and project schedule.

Project Commitment: It is assumed that the successful A/E firm will devote the level of effort, skilled manpower, and other resources necessary to complete the design work in compliance with the performance time of this contract.

Project Schedule: The A/E shall develop a detailed schedule and pert chart that outlines all of the engineering activities, including submittals and review times, for this project from start to finish. The schedule shall be generated and maintained with Microsoft Project software, and shall show the critical path and float between activities. The schedule and chart shall be submitted with the A/E firm's proposal. The schedule shall be updated with the actual start date and any necessary revisions within one week after the contract NTP, and submitted to the FAA Project Engineer.

Performance Time, Deliverables, and Submittals: The A/E shall complete all aspects of the work outlined in this SOW within the defined performance time. All change orders, revisions, or modifications to this SOW must be approved by the FAA Contracting Officer and may result in an adjustment of the performance time; however, the A/E will need to show the impacts to the project schedule, specifically the critical path, to justify additional time. The deliverables for each submittal phase are outlined in Section VIII. The final quantities of deliverables may be adjusted after contract award depending upon actual needs. Price adjustments for quantity changes will be negotiated if necessary.

Project Planning Document (PPD): The A/E shall develop and submit the PPD as specified herein. An electronic version (.PDF format) of the Palm Springs CA PPD has been included with this SOW to clearly delineate the volume and content of the information that must be included in the Tucson PPD. The A/E shall consider the volume and content of the information when developing their project schedule. Coordination with the FAA during the PPD development phase will be crucial to a successful submittal. FAA comments generated during the PPD review phase shall be promptly incorporated, and the entire PPD shall be re-submitted for FAA approval. The A/E shall not begin work on the 35% submittal until the PPD has been approved and signed by FAA, unless directed otherwise by the FAA Contracting Officer.

Coordination and Representation: The A/E will be acting as the FAA's Representative when coordinating with the TIAA, regional and local FAA offices, utility companies, etc. The FAA Project Engineer shall be notified of these meetings and an agenda shall be submitted to the FAA Project Engineer at least one week in advance. The A/E shall keep the FAA Project Engineer well informed during the entire project, and immediately notify the FAA if problems are encountered.

Design Data Handbook: The A/E shall develop and submit a "Design Data Handbook" as part of the engineering phase of this project. The Design Data Handbook shall include a narrative of the "basis of design" for all the systems in the building (i.e. civil, structural, mechanical, electrical, security, fire protection, etc.). The narratives shall include information on the system selected, how it functions, reasons why it was selected, advantages over other systems considered, expected design life (if applicable), and other pertinent information.

5. PROJECT SPECIFIC INFORMATION

The new control tower will be located on site 16 near the Raytheon facility and the "big blue" hangar. The following information includes general, as well as project-specific, design parameters that must be included in the final package:

5.1. General

5.1.1. The approximate coordinates of the ATCT on Site 16 are as follows:

Latitude: N 32^{o} 06' 39.8"
Longitude: W 110^{o} 56' 43.8"

5.1.2. The ATCT and Base Building design shall conform to the requirements set forth in "*Terminal Facilities Standard Designs A/E Project Manual*", which shall be a supplement to this SOW. If a conflict arises between the Project Manual and this SOW, the A/E shall notify the FAA Project Engineer for a resolution.

5.1.3. The *Terminal Facilities Standard Designs A/E Project Manual* has been specifically developed to compliment the FAA's new standard ATCT and Base Building drawings, and standard specifications. The A/E shall base the Tucson design on the 550 square foot, 4 column, Intermediate Activity Level standard design. The base building shall be based on the 13,000 square foot standard design. Using the standard designs promotes an efficient and economical design.

5.1.4. The ATCT and Base Building design shall incorporate "green building" concepts where it is economically feasible and reasonable. The A/E shall design with LEED silver certification as a goal.

5.1.5. The new TUS ATCT and Base Building will be owned, operated, and maintained by the FAA.

5.1.6. The FAA will administer the construction contract for this project, and may establish procedures for utilizing the successful A/E for construction support (addressing submittal reviews, requests-for-information, change orders, analysis, cost estimates, and converting FAA red-lined drawings into as-built drawings) during the construction phase of the project. The A/E shall provide a cost estimate to provide construction support for the duration of the project. If the FAA decides to utilize the A/E services, a change order to the design contract will be negotiated via the FAA Contracting Officer.

5.2. Site Work

5.2.1. E Aero Park road runs along the south side of the property. Access to the site will be off E Aero Park road. Off-site runoff bisects the site via a drainage ditch as shown on Google Earth photo and must be considered during site layout. A/E shall avoid relocating route of drainage if possible. If drainage must be rerouted to efficiently layout the site, close coordination with TIAA and all entities having jurisdiction will be required. A/E shall keep FAA project engineer informed of all coordination activities.

5.2.2. The airport fence will be relocated and a new fence installed per FAA order 1600.69 to fully enclose the site. The site will be bound by the AOA fence on two sides and the FAA fence on the remaining sides. The FAA fence must meet the 300 foot setback per FAA order 1600.69.

5.2.3. Unless the site layout and blast calculations justify otherwise, all vehicle parking shall be kept a minimum of 100 feet from any structures.

5.2.4. The A/E shall perform a parking study early in the design phase (after contract award) to determine the layout of the parking lot. Covered parking stalls shall be provided to prevent sun exposure for any vehicles and the installation of photovoltaic panels atop the covered parking shall be included in the design.

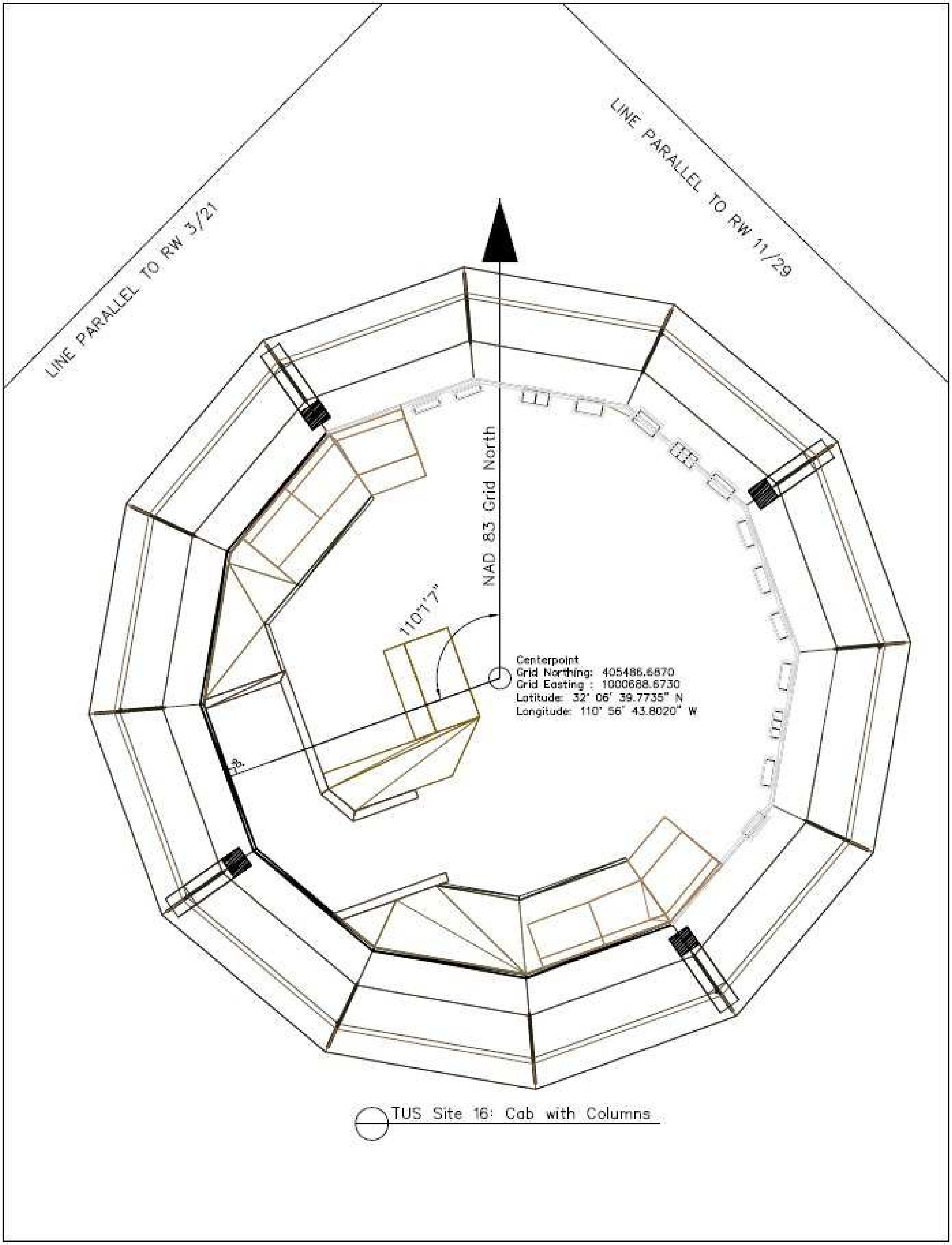
5.3. ATCT

5.3.1. The ATCT cab floor will be approximately 224 feet above ground level (AGL).

5.3.2. The ATCT cab shall be 550 square feet designed in accordance with the IAL standard design.

5.3.3. The ATCT cab roof shall be supported by four columns per the IAL standard design 4 column option. The columns shall slope outward along the same plane as the cab glass in the viewing area (between the cab consoles and the cab ceiling) if structurally feasible. The columns should be tapered to smaller dimensions through the viewing area as well. The cab consoles shall not be notched or wrapped around the cab columns in any way.

5.3.4. The cab column configuration shall reflect the AFTIL modeling per the diagram below.


LINE PARALLEL TO RW 3/21
LINE PARALLEL TO RW 11/29
NAD 83 Grid North
110°1'7"
Centerpoint
Grid Northing: 405486.6870
Grid Easting : 1000688.6730
Latitude: 32° 06' 39.7735" N
Longitude: 110° 56' 43.8020" W
TUS Site 16: Cab with Columns

5.3.5. The cab glass shall slope outward from the sill at 15 degrees. It is desirable that the cab glass be supported at the head and sill only (no vertical mullions) for maximum visibility to all aircraft movement areas. If the building design loads dictate that vertical mullions are required to support the cab glass units, the mullions shall be designed as efficiently as possible to maximize visibility.

5.3.6. If structural loading dictates that vertical mullions are not necessary, the cab shall utilize laminated glazing units with butt-glazed joints using structural silicone. The A/E shall investigate the possibility of utilizing a low-E coating with the laminated units taking into consideration any impacts to transmittance, reflectance, and distortion, as well as impacts to solar heat gain, condensation, and HVAC design. If structural loading dictates that vertical mullions are necessary, the A/E shall investigate and recommend the use of either insulated or laminated glazing units, citing the advantages and disadvantages of both. The A/E shall coordinate all cab electrical, mechanical, and HVAC design issues with the FAA Project Engineer.

5.3.7. The ATCT shaft shall be designed as a non-functional shaft (no administrative or operational functions) with an elevator and two separate stairways. Vertical shafts shall be designed within the ATCT shaft footprint to route plumbing supply and waste lines, electrical feeders and wiring, electronics cabling and wiring, grounding wires, fire sprinkler lines, etc. Mold-resistant, paperless gypsum wallboard and shaft liner panels shall be used for walls in the ATCT shaft.

5.3.8. Although the shaft will be non-functional, the ATCT structure will include administrative, operational, and environmental functions near the top of the shaft in support of the control cab. Several levels may be needed to house all of the necessary functions, and these levels will require larger footprints than the non-functional shaft. Reference the attached *Space Allocation Chart* for expected functions to be housed on the levels beneath the control cab.

5.3.9. Each stairway shall be designed to comply with the Life Safety Code and IBC. Pressurization in stairways and vestibules shall be utilized as required. Where cross-overs are allowed and/or desired from one stair to the other on intermediate floors of the ATCT shaft, exit paths shall be kept clear and unobstructed. The design shall also comply with the FAA's airport traffic control tower alternate design standard (29 CFR 1960.20).

5.3.10. Exterior balconies shall be designed to mount microwave dishes around the perimeter of the ATCT. The design shall include a method for concealing the dishes behind an approved fabric or other material that does not degrade the microwave signal. Waveguide access into the building shall be weather tight. Access to the balconies shall be coordinated with the FAA Project Engineer, and they shall be equipped with the appropriate worker safety features.

5.3.11. The ATCT will not have an Airport Surveillance and Detection Equipment (ASDE) antenna or equipment penthouse on the cab roof.

5.3.12. The FAA may utilize the guardrail around the perimeter of the ATCT cab roof for radio antenna installation. The A/E shall design a cable raceway and antenna mounting system for the cab roof. Antenna cables entering the building shall be grounded on a copper bulkhead plate that is mounted in a junction box, and the entry point shall be designed to be completely weather tight. The cab roof shall provide a safe work environment for personnel.

5.3.13. The ATCT cab roof shall be designed with a hatch for roof access. Depending upon the distance between the roof hatch and the finished ceiling of the cab, a short section of vertical ladder will likely be required. The ladder section shall be equipped with a safety post. The ceiling of the ATCT cab shall be designed with a disappearing stair system for access to the roof hatch.

5.3.14. The ATCT will not include a maintenance access ring like many of the recent and standard ATCT designs. It shall be designed with a full-height equipment room directly under the cab that will house electronics equipment, cable tray, and HVAC ductwork in support of the cab operations.

5.3.15. The electronics equipment room directly under the cab floor shall be equipped with a low-profile raised floor system. The raised floor system shall accommodate the signal reference ground grid, but shall not be used as an air plenum.

5.3.16. The ATCT will require a catwalk that allows for routine cab window maintenance and cleaning. The catwalk shall provide a safe work environment for personnel. Storm water drainage of the catwalk shall be accomplished via through-wall scuppers as opposed to floor drains. Access to the catwalk shall be from the stair leading to the control cab or other appropriate location as approved by the FAA Project Engineer.

5.3.17. The cab consoles shall be designed, fabricated, and installed utilizing the FAA National contract with Evans Consoles Inc. (contract number DTFACN-11-D-00001). The A/E shall coordinate with Evans to ensure drawings and specifications for the ATCT cab consoles conform to the requirements of the national contract.

If the national contract is not available (the base contract expires in August 2012 with two option years), the A/E must design consoles for the new ATCT. Known acceptable sources for consoles are Evans and Crenlo. Solid surface materials shall be used for writing surfaces and other counter spaces within the cab. When the construction contractor completes the installation, the consoles shall be ready for electronics equipment installation. They shall be fully grounded in accordance with FAA standards. Also, power receptacles and light switches/dimmers shall be wired and fully operational. The A/E shall include verbiage in the specification that requires a full-sized mock-up of a section of at least five operational consoles at least five weeks prior to scheduled delivery of the final product. The FAA will inspect the sample consoles and, if necessary, provide comments that must be incorporated into the final product. The sample consoles can be included with the final deliverables after the necessary changes (if applicable) are incorporated. The console design shall be bid as an option by the A/E and the government will exercise that option if necessary.

5.4. Base Building

5.4.1. The Base Building will be a single story structure with approximately 13,000 square feet of total space. The Base Building will house administrative, operational, and environmental functions. The Base Building can abut the ATCT shaft if code-compliant fire separation can be attained. If a link is necessary, it shall be kept as short as possible. Ensuring adequate space for cable tray, mechanical system piping, fire water piping etc. between the base building and ATCT (through the link building) shall be given high priority during design. BIM modeling shall confirm adequate space exists. Elevator access will be required at more than one level.

5.4.2. The Base Building shall be rectangular in shape and the corners of interior and exterior walls shall not contain acute or obtuse angles. Avoid curved walls as well.

5.4.3. Consideration shall be given to 25% future expansion of operational spaces of the Base Building. Operational spaces include the electronics equipment rooms, and TELCO room. Expansion shall not encroach upon the parking setback distance. The A/E shall consider electrical and mechanical system capacities, and methods for expansion to accommodate the 25% expansion of operational spaces.

5.4.4. The electronics equipment room(s) shall be equipped with a low-profile raised floor system. The raised floor system shall accommodate the signal reference ground grid, but shall not be used as an air plenum.

6. FINAL DESIGN AND ENGINEERING

The final deliverables under this scope of work shall include civil, architectural, structural, mechanical, fire protection, electrical and electronics drawings, as well as specifications, design calculations, a Design Data Handbook, and a construction cost estimate. Based on recent projects of similar scope and magnitude, the following sections and paragraphs outline the concepts and requirements that shall be incorporated into the final design package:

6.1. Civil Design

6.1.1. The A/E shall layout and design the structures, grading, access road(s), parking lots, curb and gutter, sidewalks, storm drainage, sanitary sewers, and other utilities such as natural gas, electricity, water, and telephone. The drawings shall clearly show the point of connection to existing utilities and accurately depict the utility routing on the site and into the building. Manholes and/or handholes, where required, shall be adequately sized and properly spaced in accordance with FAA or utility company requirements. The A/E shall contact and coordinate all utility requirements with the appropriate local suppliers.

6.1.2. The A/E shall perform a storm drainage study early in the design to determine the expected runoff from the site. The TIAA will utilize the results of the study to dictate how the storm runoff will be handled, and the A/E shall comply with the TIAA direction/recommendations.

6.1.3. The A/E shall design landscaping for the facility utilizing Xeriscaping techniques. The Presidential Memorandum titled Environmental Practices on Federal Grounds shall be incorporated into the design, as applicable.

6.1.4. A qualified testing company shall perform all necessary geotechnical tests to properly evaluate the existing soil conditions. The A/E shall evaluate the test results and specific recommendations to determine the most effective and economical foundation design for the various structures. The A/E shall provide two copies of the soil analysis report and the A/E’s conclusions from that report to the FAA.

6.1.5. The facility design shall include a security perimeter fence completely enclosing the site. The A/E shall coordinate all security requirements with Johnson Controls. Security equipment shall conform with all FAA orders and national FAA contract requirements. Johnson Controls engineers shall be consultants to the A/E throughout the design process. Security equipment includes but is not limited to vehicle gate openers, card readers, door hardware, etc. The site entrance shall accommodate the ingress and egress of employees, as well as a defined area to stop visitors for screening and vehicle searches prior to penetrating the fenced boundary.

6.1.6. Security perimeter fencing exposed to public access, as well as the entrance gate, shall be protected with anti-crash-through devices. The design vehicle size, weight, and speed will be provided to the successful A/E after contract award. Landscape features such as large boulders, earth berms, or ditches may be utilized to protect perimeter fencing. The entrance gate shall be protected with a barrier that is quickly deployable, rated to cycle open and closed very frequently, and is K-rated relative to the approach lane design. (Note: zigzags and hard turns can be utilized in the approach lane to lower the required K-rating of the barrier).

6.1.7. A diverse route for communication and control cables shall be maintained for the ATCT/base building facility in accordance with FAA Order 6000.36A. The A/E shall coordinate with the TIAA and FAA to determine if any new airfield lighting, communications, or communications ductbank is necessary. The A/E shall coordinate with TIAA to identify new ductbank routes and necessary easements, and provide surveying service to establish legal descriptions of easements.

6.1.8. The pavement design for the site roads shall meet Arizona Department of Transportation and County requirements.

6.1.9. Site design and road layouts shall accommodate single-unit vehicles (up to 30 feet long and 20,000 lbs.) to a loading dock/lift. The A/E shall coordinate with the local Fire Marshal to ensure adequate fire truck access/maneuverability is provided for fire fighting capabilities. Coordinate fire truck movement/parking areas with fire truck connections on the ATCT and/or base buildings.

6.1.10. Provide positive drainage away from the buildings. Grading away from the buildings shall be a minimum slope of 5% for the first 10 feet from the building. Finish grade elevation next to buildings shall be a minimum of 6 inches below the finish floor elevation of all ground floors.

6.1.11. The A/E shall coordinate construction parking, staging, and layout plans with the TIAA and show such areas on the construction plans. Access to, and the location of, the staging area is subject to the approval of the TIAA and FAA. Any expense associated with leasing of laydown or storage area is responsibility of the contractor.

6.2. Architectural Design

6.2.1. The space programming information provided as part of this SOW for the ATCT and Base Building shall be used by the A/E as a starting point. The room sizes and adjacencies are the result of an effort by FAA to establish some preliminary guidelines for space allocations. The A/E shall develop the floor plans based on their expertise and experience, as well as input from the FAA. Some room sizes and locations may have to be adjusted slightly to develop functional and efficient floor plans; however, the square footage of the individual rooms, as well as the entire facility, shall comply with the total allowable square footages provided, unless otherwise approved by FAA.

6.2.2. The A/E shall prepare an architectural programming document that clearly identifies the comprehensive needs for the spaces including room dimensions, privacy requirements, and security needs. This information shall be used to determine door hardware and sound attenuation requirements as well as the number and locations of electrical outlets, LAN connections, and telephone jacks. The A/E shall design the furniture layout based on UNICOR Symphony wood desks and files in private offices, Bravo workstations in areas designed for system furniture, tuxedo sofas and symphony tables in break areas. FAA will utilize the information from this document to procure furniture for the spaces via a separate contract.

6.2.3. The A/E shall design spaces slated to receive systems furniture as efficiently as possible. Power receptacles, light switches, and LAN and telephone jacks shall be fully coordinated with the systems furniture layout.

6.2.4. The A/E shall have an interior designer develop sample boards for the interior finishes for floors, walls, base, window treatments, ceilings, etc. The designer shall develop three main color schemes. For each color scheme, there shall be at least two varying shades for each type of finish (i.e. two shades of carpet, paint, vinyl tile, etc.). Furniture recommendations shall be kept in mind when developing the color schemes.

Generally speaking, selected finishes should be durable and neutral. The FAA will make the final selections with respect to type, color, pattern, etc.

6.2.5. The A/E shall prepare furniture layouts based on the UNICOR items listed in 6.2.2, and color recommendations for each room. The A/E shall provide an itemized list of furniture by room, and an itemized list of furniture by total number of pieces (for ordering purposes). The furniture color recommendations shall be coordinated with room finishes and colors.

6.2.6. If precast concrete panels are designed as an architectural building finish, the joints shall be designed to prevent water infiltration into the building. Backer rod and building sealant alone are not an acceptable method of weatherproofing the structures.

6.2.7. The security features for the facility shall comply with FAA Order 1600.69B (or latest version). The A/E shall notify the FAA Project Engineer if it becomes apparent that a specific security requirement cannot be met so that mitigating features can be designed. If necessary, a meeting can be scheduled to discuss the security requirements and/or mitigating features for the facility.

6.2.8. Glazing for all windows, except the control cab glass, shall be designed to comply with General Services Administration (GSA) 3b criteria.

6.2.9. The following items are a list of lessons-learned from past ATCT projects and should be incorporated into the TUS design:

6.2.9.1. Control Cab Consoles: The A/E shall coordinate the consoles with the locations of cable trays, floor penetrations, and HVAC ducting. No HVAC ductwork shall be installed within the base cabinets of any consoles.

6.2.9.2. Cab Columns: The cab columns can be used to route cables, wiring, plumbing lines, sprinkler lines, etc. from areas below the cab floor to areas above the cab ceiling or to the cab roof. The columns shall be designed such that entry/exit openings for such items do not impact the structural integrity.

6.2.9.3. Utilize dual shades (two, independent sets of shades) on all cab windows. Shade pockets at the cab ceiling shall be designed accordingly.

6.2.9.4. Roof Slopes: Minimum roof slope for new construction is 0.25 inch in 12 inches. Obtain drainage by sloping the roof structure; do not use wet fill material, such as lightweight, insulating concrete, to provide roof slopes. Ensure positive drainage by utilizing crickets or tapered insulation when necessary.

6.2.9.5. Roof Insulation: Do not use insulating concrete fill for roofs. Whenever possible, locate the overhead insulation on the ceiling in lieu of the roof deck.

6.2.9.6. Roofing Materials: Roofing materials shall be single-ply, elastomeric sheet roofing materials such as ethylene propylene diene monomer (EPDM) or thermoplastic polyolefin (TPO). Use of these materials should be considered in the early stages of the design. Also, consider standing seam metal roofing and water-shedding roof slope whenever feasible.

6.2.9.7. Roof Mounted Equipment: Avoid roof mounted equipment, antennas, and air terminals, if possible. Antennas and air terminal supports should be mounted to guardrails when they are necessary. The guardrail design shall maximize the number of mounts, account for structural loads, and support/integrate a cable raceway system.

6.2.9.8. Roof and Wall Flashing Details: Where guardrails are mounted to the top of parapet walls, do not utilize metal cap flashing. Guardrail posts shall be round and flashed with roofing membrane in accordance with the roofing manufacturer's instructions. Refer to the NRCA Roofing and Waterproofing Manual and SMACNA guidelines. Closure details of flashing shall be shown on the drawings.

6.2.9.9. Where near-flat roofs and/or catwalks occur, utilize through-wall scuppers to drain surfaces. Roof drains introduce rain water into the structure(s) and should be avoided.

6.2.9.10. Wall Insulation: Do not use loose insulating fill in masonry walls. Show type, thickness, and R-Value on drawings. Do not use foam plastic insulation. Exposed insulations, where applicable, shall be rated for such.

6.2.9.11. Suspended ceilings: Avoid use of fire-rated suspended ceilings – protect the structure by alternate means.

6.2.9.12. All cable penetrations of fire-rated walls and barriers shall be via UL listed fire-rated pathways (EZ Path), or UL listed assemblies approved by the FAA fire protection specialist. Cable trays shall not pass through rated walls or barriers. Removable fire-stopping barriers such as pillows and/or bricks are not recommended, but may be used under certain circumstances with the approval of the FAA Project Engineer.

6.3. Structural Design

6.3.1. The A/E shall account for site-specific loads including seismic, wind, blast, live, and dead including existing soil conditions and any special loading requirements. The design calculations shall state the design code that was used, including specific references. All structural calculations shall be overseen, approved, and sealed by a Professional Engineer registered in the state of Arizona.

NOTE: FAA Orders may contain some structural requirements that exceed the standard building codes. The FAA Project Engineer shall be notified of these conflicts; however, the more stringent requirement shall be used. It is the responsibility of the A/E to interpret the code requirements and restrictions. The FAA holds no responsibility for structural code interpretations.

6.3.2. The A/E shall follow the most updated version of published criteria, using generally accepted methods of analysis and design.

6.3.3. The description of the foundation shall include the subsurface conditions, the method of analysis and design, and the allowable capacity and time/settlement curves for any differential/uniform settlement expected. In areas of expansive soils, heave predictions are required and methods to mitigate heave. The structural engineer shall provide heave or settlement predictions appropriate for the types of soils encountered on site.

6.3.4. The contract drawings and specifications shall clearly delineate that no field welds will be allowed on main structural steel framing members.

6.3.5. The minimum security blast setback distance from the site perimeter fence is 300 feet, and the setback distance from parking areas is 100 feet. The bomb charge weight for public access areas is much larger than the bomb charge weight for parking areas. The A/E shall utilize impulses and pressures of the smaller bomb charge to optimize the parking setback distance. Bomb charge weights will be provided to the successful A/E firm. The bid shall include blast analysis costs.

6.3.6. Blast hardening recommendations and design for the facility shall be accomplished by professionals that are familiar with, and regularly engaged in, this type of design work. The A/E shall design structural systems, components, and cladding to resist blast impulses and pressures (both positive and negative). ARA consultants are a known suitable source for blast analysis.

6.3.7. The Base Building shall be designed to prevent progressive collapse.

6.3.8. Wind engineering and wind tunnel testing shall be accomplished for the ATCT by professionals that are familiar with, and regularly engaged in, this type of design work. Testing shall include an initial wind tunnel test to estimate the wind design loads early in the design process to acquire data about the structure including natural frequency, stiffness, vortex shedding capabilities, overturning base moment, and damping ratio. After the ATCT design has progressed to an appropriate level, the A/E shall perform a second wind tunnel test to obtain mean and peak simultaneous pressures, mean wind loading, and fluctuating overall wind loads on the ATCT. Data from the wind engineering and testing shall be used to evaluate tower accelerations, design cladding components, design the cab glass and framing system, etc.

6.3.9. Based on the existing normal wind loading conditions, the structure may be required to be designed based on a Dynamic Tuned Mass Damper, uniquely designed for the ATCT building and the local conditions.

6.3.10. Due to the difference in stiffness between the ATCT and base building structures, a push-over analysis may be necessary to determine the most efficient building structural system.

6.3.11. The A/E shall submit two bound copies of all structural design calculations. The structural calculations shall include, as a minimum, all hand calculations and a full printout summary and explanation of all computer analysis and design including input and assumptions. Access to full program printouts shall be available to the FAA upon request. Structural calculations shall include connection designs as applicable.

6.4. <u>Mechanical Design</u>

6.4.1. The A/E shall design the building mechanical systems in accordance with the latest industry standards where application of these standards is economically and practically feasible. Utilize ASHRAE design requirements for the Tucson area and the Terminal Facilities Standard Design A/E Project Manual, taking into account redundancy requirements.

6.4.2. Energy efficient design and life cycle costing procedures shall be accomplished in accordance with FAA-STD-033, ASHRAE 90.1, and any other local, state, or federal government regulations. The A/E shall prepare a life cycle cost and energy analysis for each of the HVAC systems considered. Consideration shall be given to heat pumps and geothermal systems, as well as chillers and boilers for HVAC design. The mechanical design shall be consistent with minimizing initial cost, maintenance requirements, energy costs, and operating costs.

6.4.3. The mechanical design shall address outside air intake and exhaust issues such as charcoal filtering and intake/exhaust short circuiting. A/E shall remain mindful of combustion exhausts, jet blast, sewer vents, and fresh air intake locations.

6.4.4. The design shall incorporate the commissioning procedures as defined in the LEED philosophy into the specifications. The sequence of operations shall be provided on the drawings.

6.4.5. The design shall provide a list of all training requirements in the specifications including the number of hours required and whether it is onsite or at the factory.

6.4.6. A/E shall design and specify non-proprietary, native backnet compatible, digital controls that can work with many systems. A/E shall consult with the FAA project engineer and FAA discipline expert on the implementation of the basis of design into the contract documents. The controls system supplier shall be locally available.

6.4.7. The A/E shall develop the design parameters for an automatic fire sprinkler system for both the ATCT and Base Building in accordance with NFPA. In lieu of a dry pipe and/or pre-action system, utilize a wet pipe, automatic fire sprinkler system for both the ATCT and Base Building.

6.4.8. Coordinate with the Fire Marshal, or other authority having jurisdiction, to investigate the possibility of utilizing a manual standpipe for the ATCT. Connections at the bottom of the ATCT would provide a means for the Fire Department to hook up and charge the standpipe with their equipment. The fire pump shall be sized accordingly.

6.4.9. E/G fuel oil systems shall be designed in compliance with NFPA and other federal, state, and local codes as well as FAA requirements.

6.5. Fire Protection

6.5.1. Fire protection can be defined as the protection of life and property against the threat of fire or other related hazards. The designer must know the everyday activity of the occupants and how to evacuate and isolate them from a fire in another space. Decisions must be made early in the design phase to economically maximize occupant safety, and to protect property/equipment. Strict integration with all engineering disciplines must be established.

6.5.2. The A/E shall obtain design approval from local authorities prior to 35 percent submittal to FAA. Essential design features to be verified include, but are not limited to, manual vs. automatic standpipe, fire department equipment requirements, fire department access to the site and buildings, water supplies for fire protection and fire alarm monitoring requirements.

6.5.3. Provide a Class A (Style 7), fully addressable, complete fire detection and notification system, covering all areas of the Base Building and ATCT. Provide supervised, remote annunciator in the control cab of the ATCT,.

6.5.4. The fire alarm system shall be specified by the A/E and designed by the installation contractor in accordance with FAA standard guidelines.

6.5.5. The specification shall include provisions for labeling all fire-rated walls. The label shall be stenciled in paint. In finished areas, the label shall be located above ceilings.

6.5.6. Provide systematic code/criteria analysis to validate design for life safety in the areas defined below. The analysis shall use the most current published version of NFPA codes (101, 72, 70, 13, etc.) as well as the most current IBC and 29 CFR 1960.20.

6.5.6.1. Egress, with particular attention to travel distance, smokeproof enclosures, elevators, vestibules, exit pathways, doors and stairs.

6.5.6.2. Compliance with requirements of the Architectural Barriers Act (ABA) and Americans with Disabilities Act (ADA).

6.5.6.3. Fire suppression systems, including water supplies, fire pumps, hydrants, fire department connections, extinguishers, standpipes, sprinklers and special protection systems.

6.5.6.3.1. Fire detection and reporting systems, recognizing that delayed egress and early warning are integral to the design. Smoke and heat detector coverage, location of notification appliances and their type (audible/visual, chime vs. horn, strobes, lens color), manual stations, annunciators, fire alarm control panels, duct detectors and interface to other systems, such as security, fire/smoke dampers, stairwell pressurization, HVAC, etc. An operations matrix should be provided.

6.5.6.3.2. The fire detection and alarm system shall comply with all applicable Underwriters Laboratories, and NFPA 72 and 101 requirements. The system shall include automatic detection, fire sprinkler flow and tamper monitoring, fire fighters telephone, elevator interfaces, HVAC interfaces and appropriate audible and visual signaling. The fire alarm system shall be capable of fire pump monitoring, stair pressurization monitoring and manual/automatic control from fire alarm system. Provide for elevator primary and secondary recall functions. Provide Digital Alarm Communicator/Transmitter (DACT) to communicate with a fire alarm monitoring service. Coordinate the system requirements to be compatible with the airport system or local monitoring agency. The contract shall have requirements for two years of maintenance and monitoring.

6.5.6.3.3. Building construction based on occupancy types, with fire resistive wall and floor requirements, interior finishes, fire/smoke dampers, fire rated penetrations, door ratings, building height, story and area limitations and presence of combustible materials.

6.6. Electrical Design

6.6.1. The A/E will be responsible for incorporating a Critical Power Distribution System into the Tucson ATCT design. The CPDS is a government-furnished, contractor-installed system. The individual components for the CPDS will be government-furnished down to the panelboard level.

6.6.2. As part of the CPDS design, the A/E shall develop an itemized list of all government-furnished equipment (GFE), which will consist of, but not limited to, an engine generators package, static transfer switches, uninterruptible power supplies, transient voltage surge suppressors, and electrical distribution gear.

6.6.3. The building electrical system shall be provided with electronic metering/monitoring capable of monitoring voltage, amperage, power factor, kva, kvar, watts, watt-hours, waveforms, harmonics, etc. The system shall be provided with a remote PC complete with software for analysis that is capable of remote access via the Internet. The extent of the monitoring system shall be as depicted in the Design Guidelines for the CPDS. The designer shall provide contractor installation drawings for the power monitoring system.

6.6.4. The electrical capacity of the facility shall be designed for actual facility requirements. The A/E shall obtain fault current data from the electrical service company, and perform short circuit analysis and protective device coordination calculations (using EDSA Micro Corporation software) for the electrical distribution system in accordance with appropriate FAA orders, standards, and other applicable codes. The engineer responsible for these studies shall be a Registered Professional Electrical Engineer with at least ten (10) years of experience, who specializes in performing power system studies. The study shall be in accordance with the specific procedures outlined in IEEE 141 (Red Book) and ANSI/IEEE 242 (Buff Book). The A/E shall work closely with FAA to assure proper electrical service capacity. The electrical design will be considered incomplete until such time as the FAA Electrical Engineer has approved the short circuit analysis and ground fault study of the facility. (Note: Soils resistivity measurements are required for a properly designed electrical system and these measurements shall be recorded on the civil and electrical drawings)

6.6.5. The intent of the short circuit analysis and protective device coordination study is to verify that the specified and supplied equipment are properly rated, correctly applied, and within industry and manufacturer tolerances. The studies will be based on Square D electrical equipment. The coordination study will determine the correct settings for the protective devices which will minimize the damage caused by an electrical fault and allow for selective coordination between the devices. The coordination study shall include the closest upstream utility protective device down to the panelboard main, branch, or feeder circuit breakers. The coordination study shall consider operation during normal conditions, alternate operation, and emergency power conditions.

6.6.6. The A/E shall work with the FAA to determine which electrical loads should be on non-essential power, essential power, or critical power. All facility electrical work shall be designed in accordance with the most stringent interpretation of the following:

- NFPA 70 - National Electrical Code
- NFPA 70E - Standard for Electrical Safety in the Workplace
- NFPA 780 - Standard for the Installation of Lightning Protection Systems
- FAA-STD-019e - Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities
- FAA Order 6950.27 - Short Circuit Analysis and Protective Device Coordination Study
- FAA-C-1217f - Interior Electrical Work
- FAA-STD-1391b - Installation and Splicing of Underground Cables
- FAA-STD-032 - Design Standards for National Airspace System Physical Facilities
- FAA-STD-033 - Design Standards for Energy Management in NAS Physical Facilities
- FAA-AC 70/7460-1J - Obstruction Marking and Lighting

6.6.7. The A/E shall work closely with the FAA to design the lightning and surge protection, grounding, bonding, and shielding (LSPGBS) systems. In addition to providing an overall project design that conforms to FAA STD-019e *Lightning Protection, Grounding, Bonding, and Shielding Requirements for Facilities* and the other pertinent model building codes, design the ATCT and Base Building structural and reinforcing steel to be electrically continuous. Provide an electrical design with cascading surge arrestors to protect electronic equipment from electrical surges in accordance with IEEE Standard 1100, *IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment* also know as the "Emerald Book." In the event of conflicts between different FAA Standards, the latest FAA STD-019e shall prevail. Utilize soil resistivity results to design the LSPGBS.

6.6.8. A complete communications grounding system shall be designed to provide an equipotential ground reference for all communications equipment per EIA/TIA standards. Characteristics of surge protection devices/arrestors shall meet requirements of latest issue FAA STD-019e and shall be provided on all electrical panels.

6.6.9. The A/E shall complete and submit a present worth, economic/energy study for the various types of lighting fixtures considered. The study must show the annual costs of power and maintenance for each fixture type over its service life. These costs shall then be brought back to present and combined with the first cost to determine the most economical type. Light emitting diode (LED) light should be considered.

6.6.10. Provide an estimate of total connected kilowatt (KW) load and demand factors, diversity, and resulting total demand kW load. Break down the loads to show lighting load, convenience receptacle load, air-conditioning loads, heating loads, pump loads, power roof ventilator loads, power receptacle loads for special equipment, load allocated for spare capacity, and special loads such as electronic equipment, air compressors, generators, etc. State the total estimated power factor, the resulting kilovolt ampere load, and size of transformers selected. Estimate separately the above for the service entrance transformer and subsequent transformers (such as dry-type transformers) within the building.

6.6.11. A complete closed circuit camera/television system shall be designed to provide surveillance of entrance facilities, parking areas, and other areas where coverage is desired. A switching and control system shall be provided that provides controlled access to monitoring positions at the Base Building security position, and a secondary nighttime position located in the ATCT, if desired. Additional control and monitor positions, recording, and other features shall be provided as dictated by user requirements.

6.6.11.1.1. Special emphasis shall be placed upon the maintainability of the security devices such as the CCTV cameras, lighting, and devices. Consideration shall be made with location, accessibility, and supply support.

6.6.11.1.2. Access control shall be provided which will restrict entry and egress to controlled areas to only holders of standard FAA badges. As designers of the TUS ATCT facility access control system, the A/E shall investigate the use of dual track or dual technology badges to allow FAA personnel to utilize one badge to access both the ATCT and the Base

Building. A known acceptable source for security equipment is Johnson Controls.

6.6.12. The FAA requires on-site badging facilities and the equipment shall be provided as part of the access control system.

6.6.13. Security requirements shall be compliant with FAA Order 1600.69B and the FAA Security Office. All security design features must be reviewed and approved by the appropriate FAA Security Agent.

6.7. Electronic Design

6.7.1. The A/E shall provide a complete structured premise wiring and cable distribution system design that is compliant with EIA/TIA 568/569/606 and other applicable BICSI standards and its notes. The system will support all digital and voice signaling for NAS and administrative networking, and telecommunications services. The cabling system will consist of an outside fiber optics cable plant and an inside copper/fiber plant serving the ATCT and base building facility.

6.7.1.1. The outside cable plant will comply with FAA Order 6000.36A, Communications Diversity. It must enter the ATCT equipment room on opposite sides, each side terminating in physically separate racks. It shall utilize single mode fiber optic cables inside a concrete encased duct bank system, and connect the ATCT/Base Building to all FAA airfield facilities.

6.7.1.2. The inside cable plant will be a hybrid copper/fiber solution. Provide a single mode fiber optics solution as part of the inside cable plant. Provide a dual copper/fiber riser between the ATCT equipment room and the Subjunction level. Use a Krone Ultim-8 connector system (or approved equal) for the copper cable plant. The copper cable plant must be installed and tested to Category 6 specifications at all locations. Network termination points will use the EIA 568A wiring standard. Use a uniform system of numbering and documentation compliant with EIA/TIA 606 for all communications facilities. The cable plant will host both NAS and administrative signaling. However, NAS and administrative systems are not integrated, and will use different work area termination points. Provide termination points at all operational consoles and at appropriate locations in the administrative area.

6.7.2. Electronics Equipment - Provide supplemental cableway/raceway and square ducts systems between equipment locations throughout the building. Emphasis shall be placed on accessibility and flexibility to accommodate change. The structured cabling system will include plans for the installation, seismic restraint, grounding, and energizing of equipment racks, distribution frames and all supporting infrastructure. Grounding systems will meet FAA STD 19e. Design the system to meet electrical, grounding, cable distribution, lighting and air conditioning requirements of the BICSI standards. Provide a complete system of riser cabling between the Base Building and the ATCT Sub-junction Level using both Single

Mode Fiber Optics and surge-protected Category 6 copper cabling. Terminate and test the fiber optic cables in a fiber patch panel. Provide surge suppression on all copper facilities that extend to upper levels of the tower. Deliverables include fiber optic cable test results, floor plans, riser diagrams, layout drawings, installations detail drawings, bill of materials, and installation and testing specifications and procedures.

6.7.3. Develop a Subsurface Utility Plan for a conduit duct bank supporting a Fiber Optics Transmission System (FOTS) Network connecting all applicable airfield facilities to the ATCT/base building facility. Use 4" steel ducts encased in concrete. Coordinate with the FAA Project Engineer to determine the number of existing and future conduit runs required. Comply with FAA Order 6000.36A, Communications Diversity. Utilize existing FAA ducts to the maximum extent possible.

6.7.4. LAN and Network Equipment - It is recognized that much of the equipment within the ATCT facility will utilize LAN and other services which, by virtue of their speed, must be multiplexed over a site-wide network. Fiber-optic services which, by virtue of their speed, must be multiplexed over a site-wide system for reasons of reliability, route diversity and network management. Space, power, and air-conditioning will be provided to accommodate this equipment as part of this scope of work. The site-wide network(s) designed to achieve desired levels of availability within the site. Infrastructure outside the boundaries of the tower and base building is not included in the scope of work.

6.7.5. Public Address System - A complete public address system shall be provided for the Base Building facility and appropriate areas of the tower facility. Loudspeaker placement and design shall provide uniform coverage at average sound pressure levels that are suitable for local ambient noise and acoustic conditions. Microphone, PBX dial access, program material and other inputs will be provided as dictated by user requirements.

6.7.6. Radio Antenna Supports and Grounding - The A/E shall design a complete system of radio/antenna mounts, raceways, and grounding to support VHF/UHF, ground and microwave facilities. All coordination shall be provided to meet aesthetic, physical, and interference concerns.

6.7.7. Electronics Equipment Rack Installation – The A/E shall include information in the design documents that outline the construction contractor’s responsibilities with respect to equipment rack installation. The contractor shall prepare the interior of the racks for power, grounding, and cabling, and have them shipped to the site. The construction contractor will be responsible for setting the racks, seismically securing them, and making the power and grounding connections. The A/E shall work with the FAA Electronics Engineer to layout the racks in a logical and efficient manner that provides adequate clearances for installation and maintenance. Since the raised floor system(s) will not be used as a plenum, the A/E shall consider methods for ensuring proper air circulation/cooling within the racks.

7. REVIEWS AND MEETINGS

Shortly after the NTP is issued, a project kickoff meeting will be scheduled in Tucson, Arizona for one week. The purpose of the meeting will be to establish points-of-contact between the FAA, the A/E, and the TIAA and discuss project requirements. The A/E may begin collecting engineering data and other pertinent information to accomplish the SOW. The A/E may schedule other trips/site visits to Tucson, at their own discretion, in support of their engineering and design efforts. These trips shall be depicted in the project schedule.

At the Project Planning Document (PPD), 35%, 70%, 95% and 100% review stages, the A/E shall distribute submittal packages to the reviewers via overnight mail. The final list of reviewers and mailing information will be provided after the NTP. For estimating purposes, the A/E shall plan to mail two submittal packages to 8 different addresses for each review stage.

The reviewers will generate comments within the allotted review period. All of the comments will be collected and consolidated by the FAA project team. The A/E project team will travel to the FAA's office to deliver, review, and discuss the comments. For scheduling purposes, each review meeting between the FAA project team and the A/E's design team shall be planned for one week.

8. SUBMITTALS

The following items are required for each submittal at the various design stages. The submittal packages shall comply with the content requirements of the *Terminal Facilities Standard Designs A/E Project Manual* for the individual disciplines. Additional information may be included at the discretion of the A/E.

8.1. Project Planning Document (PPD)

- 2 copies of the geotechnical report. Summarize the geotechnical report and include the A/E's conclusions from their analysis, including recommended foundation designs for the ATCT and Base Building in the text of the PPD
- 20 hard copies of the PPD
    - 11 x 17 format
    - Reference the electronic copy (.pdf format) of the PPD that was submitted for the Palm Springs ATCT for the expected content and format.
    - Reference sections 4.10, 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4 of the *Terminal Facilities Standard Designs A/E Project Manual* for minimum requirements.
- 1 electronic copy of the PPD in .pdf format on a CD or DVD

8.2. 35% Submittal

- Reference sections 5.5, 6.5, 7.5, 8.5, 9.5 and 10.5 of the *Terminal Facilities Standard Designs A/E Project Manual* for minimum requirements.
- 2 copies of the cost-benefit analysis on the HVAC system including initial cost and life cycle costs for each system analyzed
- 2 copies of the structural design calculations
- 2 copies of the lighting calculations
- 2 copies of the electrical load calculations and recommended sizes for the engine generator, UPS and automatic transfer switch
- Utility size and usage information shall be provided for all utility connections. This data will be used by FAA to acquire procure utility services for the facility so it must be detailed and accurate.
- 20 half-size sets of the drawings
- 2 full size sets of the drawings
- 2 copies of the specifications. Reference Sections 4.25 and 4.26 of the *Terminal Facilities Standard Designs A/E Project Manual* for minimum requirements.
- 2 copies of the revised construction cost estimate. Reference Section 4.31 of the *Terminal Facilities Standard Designs A/E Project Manual* for minimum requirements.
- 2 copies of the Design Data Handbook. Narrative shall include information about each major building system/component (e.g. the primary HVAC system selected and the major components of that system, type of backup HVAC system selected including the major components, controls, etc.)
- 1 electronic copy of each item in .PDF format on a CD or DVD

8.3. 70% Submittal

- Reference section 4.11 of the *Terminal Facilities Standard Designs A/E Project Manual* for minimum requirements.
- 20 half-size sets of the drawings
- 2 full size sets of the drawings
- 2 copies of the specifications.
- 2 copies of the revised construction cost estimate.
- 2 copies of the preliminary protective device coordination study and short circuit analysis
- 2 copies of updated structural design calculations.
- 2 copies of the Design Data Handbook.
- 1 electronic copy of each item in .PDF format on a CD or DVD
- Demolition cost estimate for the old EG building

The FAA will select the final finishes between the 70% and 100% submittals based on the various color schemes presented by the A/E and input provided up to that point. The final finish selections shall be included in the 100% submittal.

8.4. 95% Submittal

- Reference section 4.11 of the *Terminal Facilities Standard Designs A/E Project Manual* for minimum requirements.
- 20 half-size sets of the drawings
- 2 full size sets of the drawings
- 2 copies of the specifications.
- 2 copies of the revised construction cost estimate.
- 2 copies of the preliminary protective device coordination study and short circuit analysis
- 2 copies of updated structural design calculations.
- 2 copies of the Design Data Handbook.
- 1 electronic copy of each item in .PDF format on a CD or DVD
- Demolition cost estimate for the old EG building

8.5. 100% Submittal

- Reference sections 5.6, 6.6, 7.6, 8.6, 9.6 and 10.6 of the *Terminal Facilities Standard Designs A/E Project Manual* for minimum requirements.
- 20 half-size sets of the drawings
- 2 full size sets of the drawings
- 5 copies of the specifications. Reference Section 4.27 of the *Terminal Facilities Standard Designs A/E Project Manual* for minimum requirements.
- 2 copies of the revised construction cost estimate. Reference Section 4.32 of the *Terminal Facilities Standard Designs A/E Project Manual* for minimum requirements.
- 2 copies of the protective device coordination study and short circuit analysis
- 2 copies of updated structural design calculations.
- 2 copies of the Design Data Handbook.
- 20 half-size sets of the drawings
- 2 full size sets of the drawings
- 1 electronic copy of each item in .PDF format on a CD or DVD

It is the intent of the FAA that the 100% submittal is complete and final. The FAA will review and provide comments as such. If there are a substantial amount of comments generated during the 100% review process, the A/E will be required to incorporate the comments and then resubmit the drawings and specifications for an additional review. The main purpose of this additional review will be to ensure all comments have been properly incorporated into the final design. If this additional review is required, the submittals shall be the same as the 100% Submittal as stated above minus the load short circuit analysis reports, protective device coordination studies, structural analysis, and construction cost estimates, assuming there are no significant changes associated with these documents.

8.6. Final Submittal

- Reference sections 4.12, 4.28, 4.33, 5.7, 6.7, 7.7, 8.7, 9.7 and 10.7 of the *Terminal Facilities Standard Designs A/E Project Manual* for minimum requirements.
- 1 full-sized set of reproducible drawings (mylars)
- 1 unbound copy of the specification (single-sided original)
- 10 half-size sets of the drawings
- 5 full size sets of the drawings
- 10 copies of the specifications.
- 2 copies of the revised construction cost estimate.
- 2 copies of the final protective device coordination study and short circuit analysis
- 2 copies of final structural design calculations.
- 2 copies of the final Design Data Handbook.
- 1 copy of all the drawing files on CD ROM in Microstation v8 format
- 1 copy of the specification on CD ROM in MS Word 2003 (could be 2010) format

9. ATTACHMENTS

Current copies of the FAA Orders and Standards referenced within this SOW can be provided to the successful A/E upon request after contract award. The following documents and items are supplements to, and shall be considered part of, this SOW:

1. *BIM Specification*
2. *Terminal Facilities Standard Designs A/E Project Manual*
3. *Palm Springs, California ATCT Project Planning Document (PPD)*
4. *Base Building Space Allocation*
5. *ATCT Space Allocation*
6. CPDS design Guidelines

10. CONTACT INFORMATION

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Attachment 1: BIM Requirements

Building Information Modeling (BIM) Requirements for FAA Computer Aided Engineering Graphics (CAEG) Version 1.2, May 12, 2010

Introduction:

The FAA is committed to implementing BIM and is moving from a two-dimensional (2D) CAD based workflow to a three-dimensional (3D) Information Model based workflow. The following BIM requirements have been developed to define the BIM process within FAA and establish FAA requirements and protocol for the utilization of BIM in the design and construction of its new facilities. These requirements are based on the United States Army Corps of Engineers (USACE) BIM requirements.

Scope:

The intent of the following language is to establish a framework for BIM usage and solicit quotes for FAA projects to be delivered using Building Information Modeling (BIM). The scope of BIM use shall be limited to, creation of an Information Model for the purposes of coordination between various disciplines, also known as “clash detection”, and receiving 2D extractions generated from the BIM model. Deliverables shall include 3D model files of all disciplines and an Industry Foundation Classes (IFC) coordination view.

1. **Submittal Format:**

   1.1. Design Deliverables. Develop all designs using Building Information Modeling (BIM). Design submittal drawings shall be D-size, suitable for half-size (11”x17”) scaled reproduction.

   1.2. Approved BIM Authoring Tools/Software. CAEG requires the use of true Building Information Modeling, and object-oriented software applications that comply with current industry interoperability standards that can be used in a collaborative environment. The models and analysis shall be used in support of the decision making process for high performance building design and other downstream management functions. All software platforms used for FAA projects must be compliant with:

   1.2.1. Most current version of IFC file format

   1.2.2. Commercially available collaboration software that provides interoperability between different software applications (e.g. NavisWorks or equal)

Approved BIM Software for FAA Projects:

Purpose	Tools/Software
Authoring-Design, Architectural, Structural	Revit Architecture, Bentley Architecture(Triforma), Tekla
Authoring-MEP, Design and Construction	Revit MEP, AutoCAD MEP, Bentley BIM, CADDuct, CAD-Pipe,AutoSprink, PipeDesigner 3D
Authoring-Civil	Bentley Inroads and Geopak, Autodesk Civil 3D
Coordination (spatial conflict, clash detection)	NavisWorks Manage or Bentley Navigator
4D Scheduling	Vico, NavisWorks Simulate, Primavera, MS Project, Bentley Navigator
Cost Estimation	Innovaya, Vico
Energy Analysis	Green Building Studio, IES, Ecotect, Hevacomp, TAS
Specifications	E-Specs
Model Checking/ Validation	Solibri
Water Management	Bentley WaterGem

Software other than those listed above may be used subject to the above compliance requirements and approval by CAEG BIM Coordinator.

2. Design Requirements

2.1. **Drawings.** Deliver CAD files and BIM models used for the creation of the Construction Documents/ Drawings per requirements in the A/E Scope of Work, A/E Project Manual, and as noted herein. CAD drawings extracted from the BIM models shall comply with FAA-STD-002g standards. Any deviations must be approved by the regional FAA CAD manager. Any areas of conflict between the A/E Project Manual and FAA-STD-002g must be brought to the attention of the FAA project engineer. Traditional 2D documentation shall be prepared with approved IFC-compliant BIM Authoring Software and, as such, the expectation shall be that plans, elevations, sections, schedules, and details are fully coordinated with the concurrent building model. All other documents are to be submitted per the contract requirements of the A/E Scope of Work. Specification of a CAD file format for these Drawings does not limit which BIM application(s) or software(s) may be used for project development and execution

2.2. **BIM Model and Facility Data.** The A/E shall select BIM application(s) and software(s) and develop project designs using BIM software. Use 3D graphic model(s) (the “Model”) and associated intelligent attribute data (“Facility Data”) created by this software to produce accurate Construction Documents. All submitted BIM Models and associated Facility Data shall be fully compatible with Autodesk Revit 2009 (or higher) or Bentley BIM v8 (or higher) file format. A platform neutral BIM with performance based specifications, interactive for the user, and capable of being converted to a FAA standard platform. Facility data contained in the Building model shall be consistent with the structure of IFC 2x3 coordination view or better as defined in section 2.2.1.

2.2.1. IFC Coordination View. The Contractor's selected BIM application(s) and software(s) must be certified in the IFC Coordination View 2x3 or better (see www.iai-na.org). The coordination view shall contain the basic BIM model, as shared between the major disciplines within the design phase and shall include the following:

- Coordination between design disciplines (architecture, building services, structural) and with the client
- Building spatial structure of the BIM model
- Elements of the BIM model with their semantic information
- Logical structure of elements (within spatial structure, aggregation and decomposition, features, etc.)
- Spaces of the BIM model with their semantic information
- Logical structure of spaces (within spatial structure, elements included, etc., leading to a space book)
- Basic clash detection (3D geometry based)
- Basic communication about the design (2D/3D geometry based)
- Basic visual design intentions (2D/3D presentation information -color, hatching, rendering)
- The exchange of property information

Submit any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment for Government approval.

2.2.2. Submittal Requirements. BIM submittals shall conform to the requirements of section 3, section 4, and the A/E Project Manual.

2.2.3. Implementation Plan and Scope: The purpose of the Building Information Model is to serve as a coordination conflict resolution model between design and construction phases and eliminate all potential clashes prior to the beginning of construction. The Model is expected to demonstrate spatial interferences between various systems and disciplines. The scope of this model is limited to Schematic Design, Design Development and Construction Document phases only and does not extend to Construction Administration.

2.2.3.1. The Project Planning Document (PPD) shall include an Implementation Plan documenting viability of the BIM design and analysis technologies selected for the Project Model (integrated with the AEC CAD Standard) from concept development through As-Builts as a design, production, coordination, construction, and documentation tool and the collaborative process by which it shall be implemented. The BIM Implementation Plan shall be fully coordinated with the scope of the A/E Project Manual.

2.2.3.2. The Implementation Plan shall describe uses of BIM during design and construction phases to include value management, interference management, and design-change tracking, or such other uses as the Contractor proposes.

2.2.3.3. The Implementation Plan shall identify how the BIM data shall be managed and interoperate (data storage, sharing, viewing, quality control parameters in Section 2.3 Quality Control, and updating, as necessary) among all Contractor team members.

2.2.3.4. Conduct an Implementation Plan demonstration at the Initial Project Kick-off Meeting to review the Implementation Plan for clarification, and to verify the functionality of Model technology workflow and processes. The Government shall confirm acceptability of the Plan or advise as to additional processes or activities necessary to be incorporated into the Plan. If modifications are required, the Contractor shall execute the modifications and resubmit the final Implementation Plan for Government acceptance. There will be no payment for design or construction until the Plan is acceptable to the Government. The Government may also withhold payment for design and construction for unacceptable performance in executing the Implementation Plan.

2.2.4. <u>Model Components</u>. The Model shall include the following, subject to Government concurrence:

2.2.4.1. <u>Project Specific BIM Facility Data</u>. Develop the Facility Data, consisting of a set of intelligent elements for the Model (e.g., doors, air handlers, electrical panels, ducts, beams etc). This Facility Data shall include all material definitions, qualities, and attributes that are necessary for the Project facility design, consistent with the structure of IFC 2x3 Coordination View and limited by the scope of the BIM implementation plan as outlined in section 2.2.3

2.2.4.2. <u>Project Specific Minimum Requirements</u>. The Model shall include, at a minimum, the requirements "of Section 4 below. The Government must agree with any proposed modifications to minimum requirements before incorporation into the Model.

2.2.4.3. <u>Facility Data Output</u>. Each submittal under Section 3 shall include a list of Construction Documents (e.g., drawings, elevations, design sections and schedules, details) that shall be produced from the Facility Data and updated as necessary.

2.2.4.4. <u>Model Granularity.</u> Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a quarter inch (1/4" = 1'0") scaled drawing (e.g. at least 1/16th, 1/8th and 1/4th) and all the elements of fire protection, or appropriately scaled civil drawings.

2.3. <u>Quality Control</u>. The A/E shall provide the Coordination View Information Exchange (CVIE), as specified below. The A/E shall submit this deliverable to partially demonstrate their fulfillment of the requirements to fully coordinate design disciplines into a single cohesive design, as part of their approved Quality Control plan. The CVIE is based upon the International Alliance for Interoperability Industry Foundation Class 2x3 Coordination View format. See section 2.2.1. CVIE deliverables, described below, are comprised of: (1) the IFC Coordination View and (2) BIM model collision detection reports.

The contractor is responsible for implementing quality control (QC) parameters for the Model, including:

2.3.1. Standards Checks. QC checking performed to ensure that the fonts, dimensions, line styles, levels and other contract document formatting issues are followed per the FAA-STD-002g CAD Standard (latest revision)

2.3.2. Model Integrity Checks. QC validation used to ensure that the Project Facility Data set has no undefined, incorrectly defined, or duplicated elements. Report non-compliant elements and provide justification acceptable to the Government if allowed to remain within the Model.

2.3.3. Other Parameters. Develop such other QC parameters as the A/E deems appropriate for the Project and provide to the Government for concurrence.

2.4. Design and Coordination Reviews. Perform design and coordination reviews at each submittal stage under Section 3 to test the Model, including:

2.4.1. Visual Checks. Checking to ensure the design intent has been followed and that there are no unintended elements in the Model.

2.4.2. Interference Management Checks. Locating conflicting spatial data in the Model where two elements are occupying the same physical space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location) and soft interferences (conflicts regarding service access, fireproofing, insulation) in a written report and resolve. Coordination software will be used for assembling the various design models and for providing a report and view list of design coordination issues. Detailed records of all such conflict resolutions shall be maintained. The Design Team, including Team BIM Facilitator and Discipline BIM Lead Modelers, will review the model and the Clash Reports in coordination meetings with FAA personnel on a regular (weekly) basis.

2.4.3. IFC Coordination View. Provide an IFC Coordination View in IFC Express format for all deliverables. Provide exported property set data for all IFC supported named building elements.

2.4.4. Other Parameters. Develop such other Review parameters as the A/E deems appropriate for the Project and provide to the Government for concurrence.

3. Design Stage Submittal Requirements

3.1. Submittal Requirements.

3.1.1. Provide submittals in compliance with Implementation Plan deliverables at stages as described hereinafter.

3.1.2. Provide a Contractor-certified written report with each design submittal, confirming that consistency checks as identified in Paragraphs 2.3 and 2.4 have been completed for the design submittal. This report shall be discussed as part of the design review meeting and shall address cross-discipline interferences, if any.

3.1.3. Following Government review and concurrence at each Stage in Paragraphs 3.3 through 3.5, provide the Government a 3-D interactive visualization from the Model in Navisworks, ProjectWise Navigator, Adobe 3D PDF 7.0 (or later), Google Earth KMZ or equivalent format. The Government may request other formats if needed to address Project-specific requirements.

3.2. Preliminary Implementation Review. Prior to the 35% Design Submittal, demonstrate preliminary development of Model components and Facility Data identified in

Paragraph 'Model Components'. Review the Model with the Government for conformity to program, massing, circulation, fire protection, security and sustainability Project requirements consistent with the Implementation Plan.

3.3. Design Submittals.

3.3.1. BIM and CAD Data. The submitted Models shall include architectural, structural, electrical, mechanical, plumbing, fire protection, security systems, and Facility Data, to satisfy the Project Planning Document, 35% Design, 70% Design, 95% Design, and 100% Design review cycles prescribed in the A/E Scope of Work. Submit the Model, Facility, CVIE dataset, and CAD Data/Drawing files in native and interoperable formats and any rendering files, on DVD/CD-ROM.

3.3.2. Submittal packages. The A/E shall submit IFC Model View files and collision detection reports with each deliverable.

3.3.3. CVIE deliverables, as specified in section 2.3 shall be included with all required design submissions that require review. In accordance with the A/E's Quality Control plan, they shall use the CVIE deliverable to demonstrate that they have evaluated each collision identified by the BIM and or Model Checking software and documented the collision. The A/E shall provide their report with each CVIE Deliverable.

The A/E shall produce and submit CVIE reports directly from Building Information Model or Model Checking software. The CVIE report shall be provided in PDF or XML Format. If provided in XML, a Cascading Style Sheet allowing review of the XML data in a web browser shall also be provided.

The collision detection report shall identify the GUID (Globally Unique Identifier) and human-readable name of each object involved in each collision. The collision detection report shall provide a graphic image for each collision highlighting those objects involved in the error. Images may be provided within the PDF report, or as separate .jpg files referenced in the XML report.

4. BIM Model Minimum Requirements and Output

4.1. General Provisions. The deliverable Model shall be developed to include the systems described below as they would be built. The information in the model shall be developed to include as many of the systems described below as are necessary and appropriate as per section 2.2.3 "Implementation Plan and Scope and shall satisfy the requirements of the Project Planning Document, 35% Design, 70%, 95% Design, and 100% Design review cycles prescribed in the A/E Scope of Work. Existing conditions shall be exempt from the modeling requirements except at areas where the new systems interface with existing.

4.2. Architectural/Interior Design. The Architectural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.2.1. Spaces. The Model shall include spaces defining accurate net square footage and net volume, and holding data for the room finish schedule for including room names and numbers. Include Programmatic Information provided by the

Government or validated program to verify design space against programmed space, using this information to validate area quantities.

4.2.2. Walls and Curtain Walls. Each wall shall be depicted to the exact height, length, width and ratings (thermal, acoustic, fire) to properly reflect wall types. The Model shall include all walls, both interior and exterior, and the necessary intelligence to produce accurate plans, sections and elevations depicting these design elements

4.2.3. Doors, Windows and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.

4.2.4. Roof. The Model shall include the roof configuration, drainage system, major penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.

4.2.5. Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.

4.2.6. Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.

4.2.7. Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.8. Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.9. Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.

4.2.10. Schedules. Provide door, window, hardware, sets using BHMA designations, flooring, and wall finish, and signage schedules from the Model, indicating the type, materials and finishes used in the design.

4.3. Furniture/Fixtures/Equipment (FFE). 3D representation of FFE elements is preferred. For projects with an extensive systems furniture layout that may impact BIM system performance the Contractor will contact the Government for consideration of 2D representation. The FFE systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

4.3.1. Furniture. The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing, and shall include all relevant office equipment and furniture system layouts, with necessary intelligence to produce accurate plans, sections, perspectives and elevations necessary to completely depict furniture systems locations and sizes.

4.3.1.1. **System Coordination.** Furniture that makes use of electrical, data, plumbing or other features shall include the necessary intelligence to produce coordinated documents and data.

4.3.2. **Fixtures and Equipment.** Fixtures and equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans, elevations, sections and schedules depicting their configuration

4.3.3. **Schedules.** Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.

4.4. **Structural.** The structural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.4.1. **Foundations.** All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations.

4.4.2. **Floor Slabs.** Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.

4.4.3. **Structural Steel.** All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.

4.4.4. **Cast-in-Place Concrete.** All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.

4.4.5. **Expansion/Contraction Joints.** Joints shall be accurately depicted.

4.4.6. **Stairs.** The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.

4.4.7. **Shafts and Pits.** The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.

4.5. **Mechanical.** The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.5.1. **HVAC.** All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules. All piping larger than 1.5" diameter shall be modeled.

4.5.1.1. **Mechanical Piping.** All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules. All piping larger than 1.5" diameter shall be modeled.

4.5.2. **Plumbing.** All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All piping larger than 1.5” diameter shall be modeled.

4.5.3. Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.

4.5.4. Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.6. Electrical/Telecommunications. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

4.6.1. Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panelboards and control systems), including necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents. Lighting and power built into furniture/equipment shall be modeled.

4.6.2. Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.

4.6.3. Grounding Systems. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications grounding systems, bonding), including necessary intelligence to produce accurate plans, details and schedules.

4.6.4. Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents. Communications conduit larger than 1.5” shall be modeled.

4.6.5. Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.

4.6.6. Equipment Clearances. All lighting and communications equipment clearances and no-fly zones shall be modeled for use in interference management and maintenance access requirements.

4.7. Fire Protection. The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

4.7.1. Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled.

- **4.7.2. <u>Fire Alarms</u>.** Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.

4.8. <u>Civil</u>. The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a one inch (1"=100') scaled drawing. Additional <u>minimum</u> Model requirements include:

- **4.8.1. <u>Terrain (DTM)</u>.** All relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.
- **4.8.2. <u>Drainage</u>.** All existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.
- **4.8.3. <u>Storm Water and Sanitary Sewers</u>.** All existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.
- **4.8.4. <u>Utilities</u>.** All necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.
- **4.8.5. <u>Roads and Parking</u>.** All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

4.9. <u>CVIE and BIM</u>. The A/E shall utilize the native objects provided in the BIM to create the models upon which the CVIE is based. Geometric-only representations of required Coordination View entities shall not be allowed. The A/E shall maintain a Globally Unique Identifier (GUID) for each BIM objects, physical room, and functional spaces. The A/E shall not change GUID's for objects and spaces that are submitted in subsequent deliverables. Multiple BIM files may be used to create the CVIE. If this is the case, then the A/E shall provide each of these individual files with each CVIE deliverable. The A/E shall utilize a common registration point for all design disciplines included in the CVIE even if this model is provided in multiple files. The A/E shall configure collision detection software, either embedded in their BIM software or separate software, to identify all physical overlaps of BIM objects.

5. Ownership and Rights in Data

5.1. <u>Ownership</u>. The Government has ownership of and rights to all CAD files, the BIM Model, and Facility Data developed for the Project in accordance with FAR Part 27. The Government may make use of this data following any deliverable.

6. Contractor Electives

1.1. <u>Applicable Criteria.</u> The Contractor may elect to submit one or more of the following features as a separate cost line item in its contract proposal. The following criteria are requirements, as applicable to those elective feature(s).

1.2. <u>Project Scheduling using the Model.</u> In the Implementation Plan and during the Preliminary Implementation Review, provide an overview of the use of BIM in the development and support of the project construction schedule.

1.2.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver the construction schedule with information derived from the Model.

1.2.2. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model for project scheduling.

1.3. Cost Estimating. In the Implementation Plan and during the Preliminary Implementation Review, provide an overview of the use of BIM in the development and support of cost estimating requirements, or other applications such as cost analysis and estimate validation.

1.3.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver cost estimating information derived from the Model.

1.3.2. Project completion. At project completion, the A/E shall provide an MII (Micro Computer Aided Cost Estimating System Generation II) Cost Estimate which follows the USACE Cost Engineering Military Work Breakdown System (WBS), a modified uniformat, to at least the subsystems level and uses quantity information supplied directly from BIM output to the maximum extent possible, though other "Gap" quantity information will be included as necessary for a complete and accurate cost estimate.

1.3.2.1. Sub system level extracted quantities from the BIM for use within the estimate shall be provided according to how detailed line items or tasks should be installed/built so that accurate costs can be developed and/or reflected. Therefore, when developing a BIM, the designer shall be cognizant of what tasks need to be separated appropriately at the beginning stages of model development, such as tasks done on the first floor versus the same task on higher floors that will be more labor intensive and therefore need to have a separate quantity and be priced differently. Tasks and their extracted quantities from the BIM shall be broken done by their location (proximity in the structure) as well as the complexity of its installation.

1.3.2.2. At all design stages it shall be understood that BIM output as described in this document will not generate all quantities that are necessary in order to develop a complete and accurate cost estimate of the project based on the design. An example of this would be plumbing that is less than 1.5" diameter and therefore not expected to be modeled due to granularity; this information is commonly referred to as The Gap. Quantities from The Gap and their associated costs shall be included in the final project actual cost estimates as well.

2. Drawing Preparation:

a) General -All drawings shall be prepared in accordance with FAA Order 002 Drawing Standards.

b) Use the Standard Designs CD to obtain the 002f CAD Standards

c) Use the Standard Designs CD to obtain the Construction Drawings Matrix.

Information pertaining to the project number, title, and the JCN number shall be provided by the FAA Project Engineer as a part of the project requirements.

3. Specifications:

Information pertaining to the specification requirements, including any spec templates that are to be used shall be provided by Engineering Services as a part of the project requirements.

4. Task Order Submittals:
Print quantity deliverables and submission schedules shall be provided to the FAA Project Engineer as a part of the project requirements

5. Schedule:
Critical Design Milestones, and design submittal schedule shall be provided by the FAA Project Engineer as a part of the project requirements.

6. Contacts:
A list of primary project contacts will be provided by the FAA Project Engineer as a part of the project requirements.

Attachment 2: A/E Project Manual

FAA ATO

July 27, 2009

Terminal Facilities Standard Designs

A/E Project Manual

Attachment 3: Palm Springs PPD

PROJECT PLANNING DOCUMENT

Attachment 4: Base Building floor space allocation.

Tuscon TUS ATCT Base Building

13,000sf Standard Design

Administrative Space Usage Calculation			
Administrative Area	**Area**		
100 Vestibule (100%)	51		
101 Corridor (Fire Path exit)	0		
102 Corridor (100%)	206		
104 Corridor (Fire Exit Path)	0		
105 Vestibule (Fire Exit Path)	0		
106 Corridor (0%)	0		
107 Vestibule (0%)	0		
110 AF Admin	88		
111 Tech Ops Manager	140		
112 AF	94		
113 Tech Library	112		
114 File Copier	85		
121 Storage	160		
123 Conference Room	314		
125 Breakroom/Kitchen	435		
140 AT Admin	88		
142 AT	93		
143 Ops Sups	119		
144 Open Area	928		
154 CBI	116		
153 Debrief	98		
190 Admin Open Area	1892		
		Personnel	
		AT Max Shift	**21**
		ATO-W Tech Ops Max Shift	**18**
		Total	**39**
Total	5019	Admin Space Utilization sf/person	**129**

< 152.5

Notes:
1. Administrative area room annotations above are based upon the standard design floor plan layout to capture all administrative space in the 13,000 standard design base building. Administrative area room layout will change during the 10% design phase to address site specific needs, but the the overall administrative space will remain the same.

2. AT and AF max shift data pulled from associated RDWB staffing tabs.

3. A suggested TUS floorplan can be found on the 13,000SF floorplan tab.

Attachment 5: CPDS Basic Design Guidelines

Design Guidelines

FOR THE

TYPE BASIC & BASIC CAB CRITICAL POWER DISTRIBUTION SYSTEM (CPDS)

Contract Number

CONTRACTOR

CACI (Paradigm Solutions)

1100 North Glebe Road
Arlington, VA

Design Guidelines developed for

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

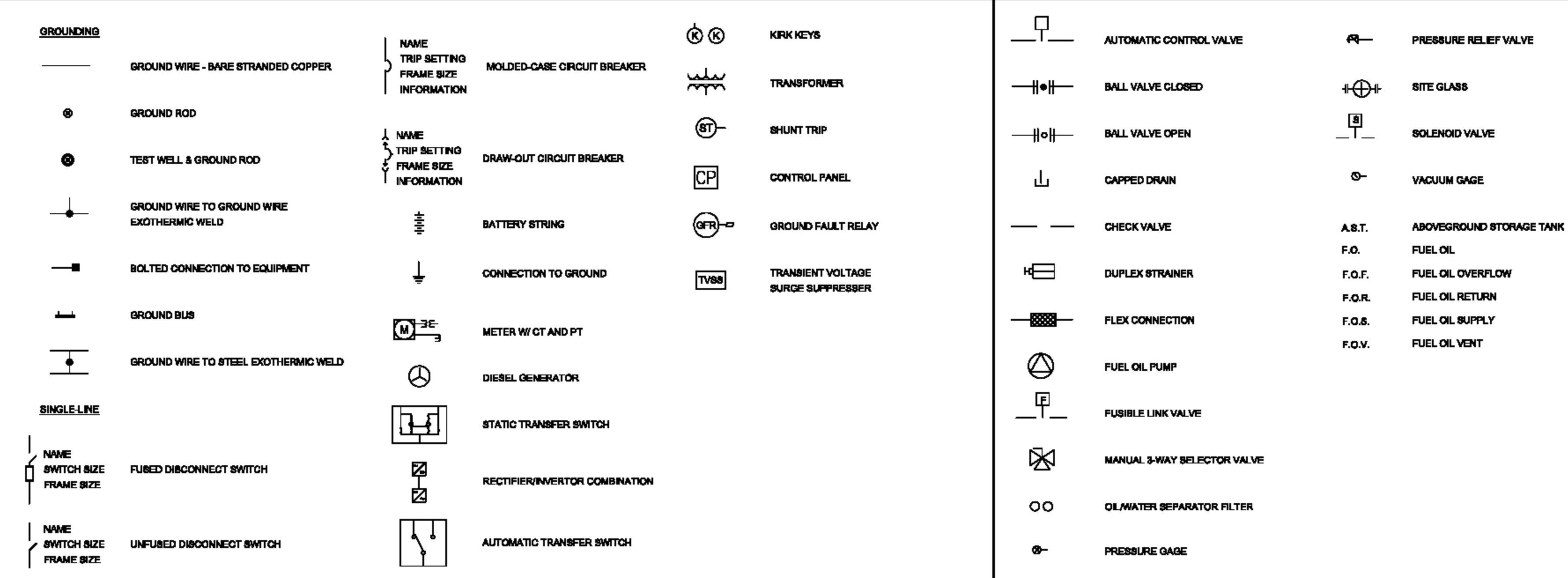
January 25, 2012

Attachment 6: CPDS Type Basic Drawing Set

G1 ELECTRICAL ABBREVIATIONS

N.T.S.

ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
BC	BARE COPPER
BATT	BATTERY
BTM	BOTTOM
BKR	BREAKER
BLDG	BUILDING
C	CONDUIT
CAB	CABINET
CB	CIRCUIT BREAKER
CFCI	CONTRACTOR FURNISHED CONTRACTOR INSTALLED
CKT	CIRCUIT
℄	CENTER LINE
CO	CONTRACTING OFFICER
COL	COLUMN
COMM	COMMUNICATIONS
CONC	CONCRETE
CONN	CONNECTION, CONNECT
COORD	COORDINATE
CONTR	CONTRACTOR
CP	CONTROL PANEL
CT	CURRENT TRANSFORMER
DET	DETECTOR
DIA	DIAMETER
DISC	DISCONNECT
DIST	DISTRIBUTION
DN	DOWN
DP	DISTRIBUTION PANEL
DWG	DRAWING
EA	EACH
EL	ELEVATION
EQUIP	EQUIPMENT
EX	EXISTING
EXIST	EXISTING
EXT	EXTERIOR
F	FUSE(D)
FIXT	FIXTURE
FL	FLOOR
FLR	FLOOR
FLEX	FLEXIBLE
FO	FIBER OPTIC
FURN	FURNISH, FURNITURE
G	GROUND
GALV	GALVANIZE(D)
GEN	GENERATOR
GFE	GOVERNMENT FURNISHED EQUIPMENT
GFE-CI	GOVERNMENT FURNISHED EQUIPMENT CONTRACTOR INSTALLED
GFI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTION
GRD	GROUND
HD	HEAVY DUTY
HGT	HEIGHT
HPF	HIGH POWER FACTOR
HV	HIGH VOLTAGE
IC	INTERCOMMUNICATION
ID	IDENTITY, IDENTIFICATION
IR	PASSIVE INFRARED
J-BOX	JUNCTION BOX
JB	JUNCTION BOX
LSIG	LONG TIME DELAY, SHORT TIME DELAY, INSTANTANEOUS, GROUND FAULT
mA	MILLI-AMPERE
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MFR	MANUFACTURER
MIN	MINIMUM
MLO	MAIN LUG ONLY
MM	MULTIMODE
MT	MOUNT
MTD	MOUNTED
N	NORTH
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
OH	OVERHEAD
P	POLE(S)
PB	PUSHBUTTON
PF	POWER FACTOR
PH	PHASE
PNL	PANEL
PR	PAIR
PRI	PRIMARY
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
PWR	POWER
Ø	PHASE
RECP	RECEPTACLE
RGS	RIGID GALVANIZED STEEL CONDUIT
SM	SINGLE MODE
SPC	SPACE
SPKR	SPEAKER
SQ	SQUARE
SS	STAINLESS STEEL
STP	SHIELDED TWISTED PAIR
STS	STATIC TRANSFER SWITCH
SUSP	SUSPEND(ED)
SW	SWITCH
SWBD	SWITCHBOARD
TEMP	TEMPORARY
TERM	TERMINAL, TERMINATE
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSER
TW	TWISTED
TYP	TYPICAL
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
UTIL	UTILITY
UTP	UNSHIELDED TWISTED PAIR
V	VOLT(S)
VA	VOLT-AMPERE
W	WIRE
WI	WITH
WP	WEATHERPROOF
WT	WATERTIGHT
XP	EXPLOSION PROOF
XFMR	TRANSFORMER
Y	WYE CONNECTION



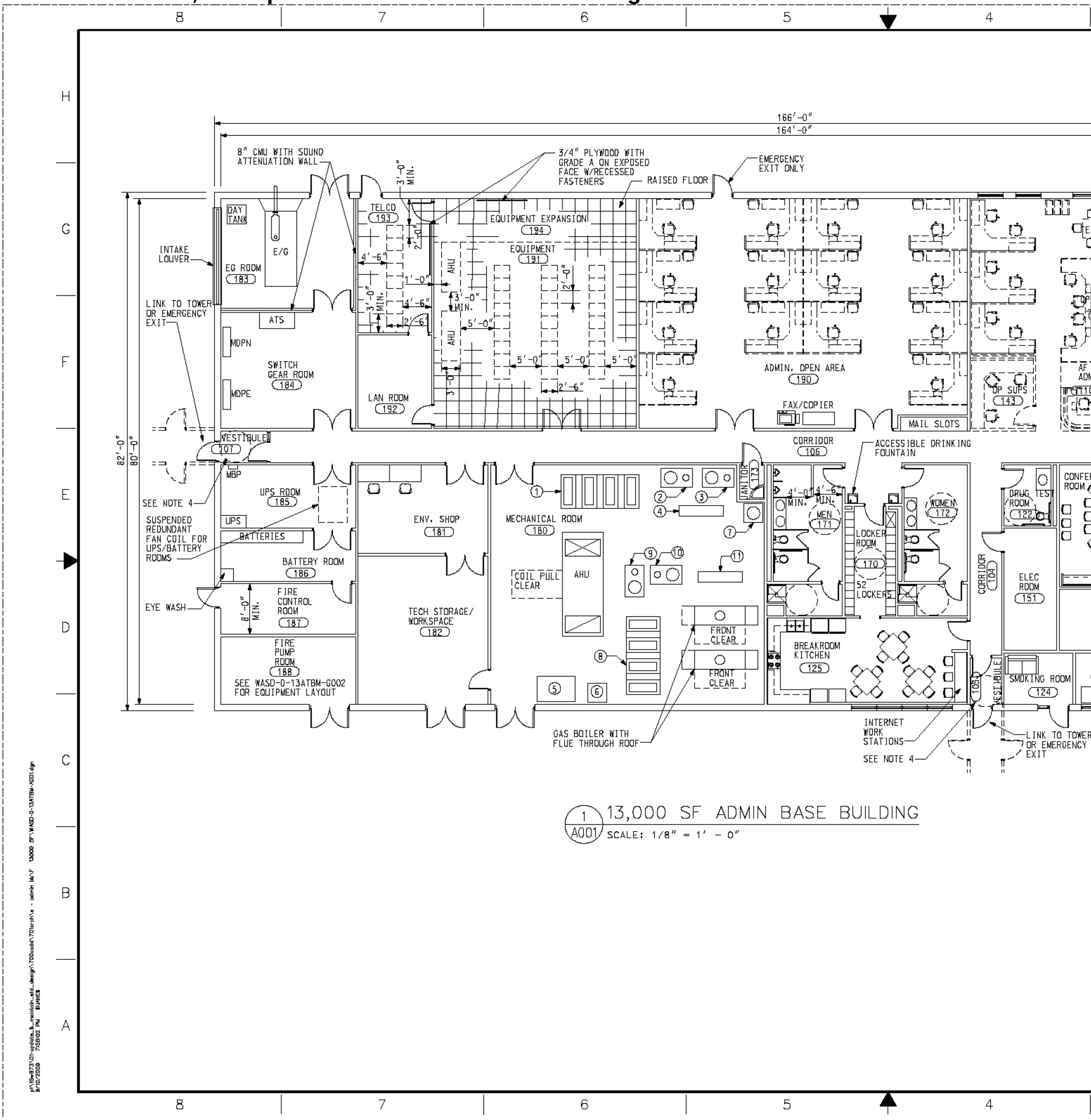
A1 ELECTRICAL SYMBOLS

N.T.S.

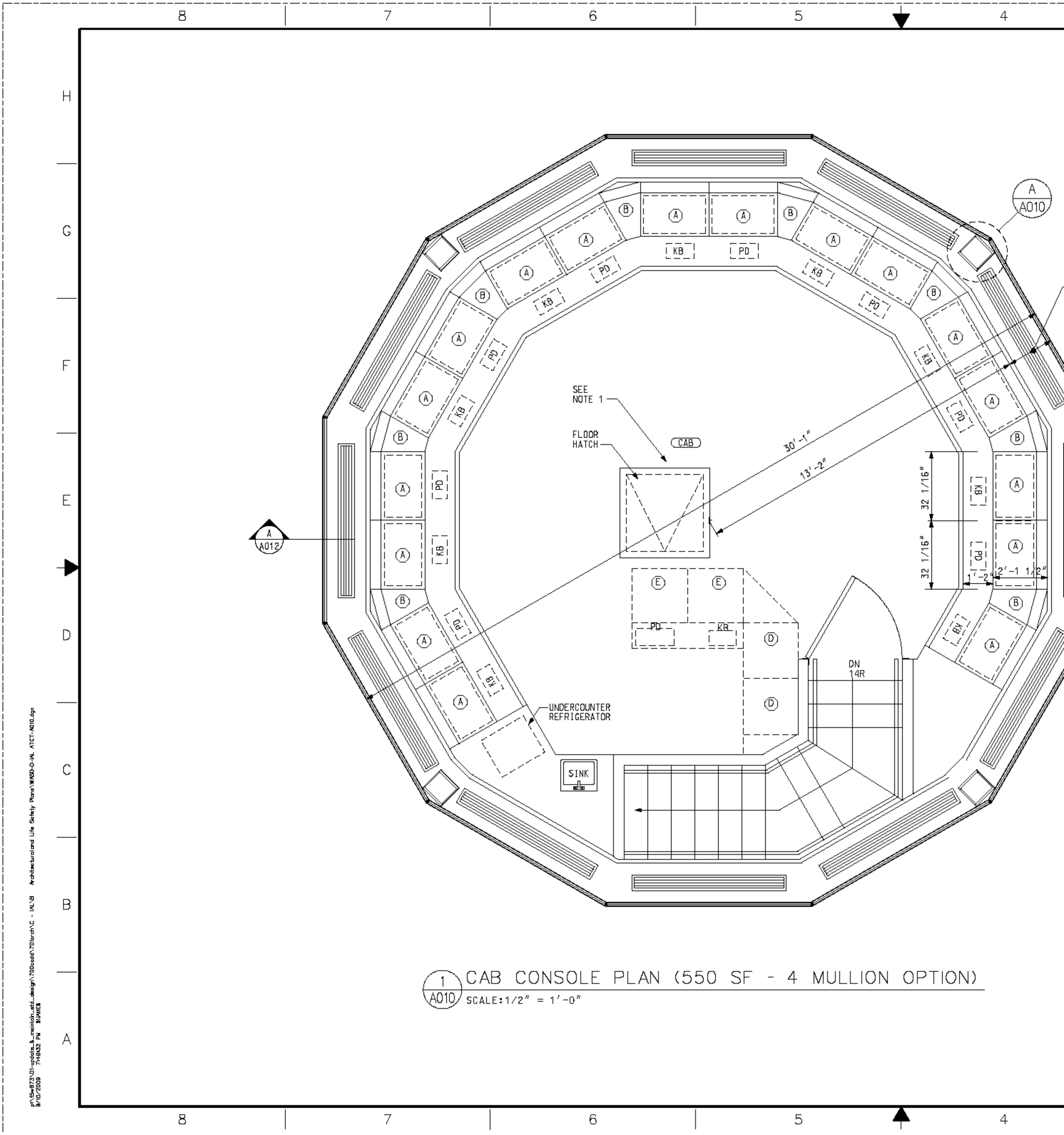
A9 FUEL OIL SYMBOLS AND ABBREVIATIONS

N.T.S.

Attachment 7: 13,000 Square Foot Standard Basebuilding Floor Plan



Attachment 8: 550 Square Foot ATCT Standard Floor Plan



Attachment 9: 40 USC Sec. 3312

(http://uscode.house.gov/download/pls/40C33.txt)

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    40 USC Sec. 3312                                          01/07/2011

-EXPCITE-
    TITLE 40 - PUBLIC BUILDINGS, PROPERTY, AND WORKS
    SUBTITLE II - PUBLIC BUILDINGS AND WORKS
    PART A - GENERAL
    CHAPTER 33 - ACQUISITION, CONSTRUCTION, AND ALTERATION

-HEAD-
    Sec. 3312. Compliance with nationally recognized codes

-STATUTE-
      (a) Application. -
        (1) In general. - This section applies to any project for
      construction or alteration of a building for which amounts are
      first appropriated for a fiscal year beginning after September
      30, 1989.
        (2) National security waiver. - This section does not apply to
      a building for which the Administrator of General Services or the
      head of the federal agency authorized to construct or alter the
      building decides that the application of this section to the
      building would adversely affect national security. A decision
      under this subsection is not subject to administrative or
      judicial review.

      (b) Building Codes. - Each building constructed or altered by the
    General Services Administration or any other federal agency shall
    be constructed or altered, to the maximum extent feasible as
    determined by the Administrator or the head of the federal agency,
    in compliance with one of the nationally recognized model building
    codes and with other applicable nationally recognized codes,
    including electrical codes, fire and life safety codes, and
    plumbing codes, as the Administrator decides is appropriate. In
    carrying out this subsection, the Administrator or the head of the
    federal agency shall use the latest edition of the nationally
    recognized codes.
      (c) Zoning Laws. - Each building constructed or altered by the
    Administration or any other federal agency shall be constructed or
    altered only after consideration of all requirements (except
    procedural requirements) of the following laws of a State or a
    political subdivision of a State, which would apply to the building
    if it were not a building constructed or altered by a federal
    agency:
        (1) Zoning laws.
        (2) Laws relating to landscaping, open space, minimum distance
      of a building from the property line, maximum height of a
      building, historic preservation, esthetic qualities of a
      building, and other similar laws.

      (d) Cooperation With State and Local Officials. -
        (1) State and local government consultation, review, and
      inspections. - To meet the requirements of subsections (b) and
```

(c), the Administrator or the head of the federal agency authorized to construct or alter the building -

(A) in preparing plans for the building, shall consult with appropriate officials of the State or political subdivision of a State, or both, in which the building will be located;

(B) on request shall submit the plans in a timely manner to the officials for review by the officials for a reasonable period of time not exceeding 30 days; and

(C) shall permit inspection by the officials during construction or alteration of the building, in accordance with the customary schedule of inspections for construction or alteration of buildings in the locality, if the officials provide to the Administrator or the head of the federal agency -

(i) a copy of the schedule before construction of the building is begun; and

(ii) reasonable notice of their intention to conduct any inspection before conducting the inspection.

(2) Limitation on responsibilities. - This section does not impose an obligation on any State or political subdivision to take any action under paragraph (1).

(e) State and Local Government Recommendations. - Appropriate officials of a State or political subdivision of a State may make recommendations to the Administrator or the head of the federal agency authorized to construct or alter a building concerning measures necessary to meet the requirements of subsections (b) and (c). The officials also may make recommendations to the Administrator or the head of the federal agency concerning measures which should be taken in the construction or alteration of the building to take into account local conditions. The Administrator or the head of the agency shall give due consideration to the recommendations.

(f) Effect of Noncompliance. - An action may not be brought against the Federal Government and a fine or penalty may not be imposed against the Government for failure to meet the requirements of subsection (b), (c), or (d) or for failure to carry out any recommendation under subsection (e).

(g) Limitation on Liability. - The Government and its contractors shall not be required to pay any amount for any action a State or a political subdivision of a State takes to carry out this section, including reviewing plans, carrying out on-site inspections, issuing building permits, and making recommendations.

Attachment 10: Document Revision Log

Reviewer	Comment	Disposition
1) Jill Gough	As discussed, the QVL list doesn't exist so would imagine the first paragraph under paragraph II Scope referencing a QVL list should be deleted. On page one the reviews are listed as 35%, 70%, 95% and 100%, but later on page 38 (maybe other places) it mentions 90%. Just want to be consistent in what we call that review either 90% or 95%. On page 16 and 17, Site Work paragraph 1. Suggest changing the 2nd paragraph to something like this : Off-site runoff bisects the site via a drainage ditch as shown on Google Earth and must be considered during site layout." On page 21, paragraph 17. The way this paragraph is written, the AE will have to include costs for the design of the consoles without using the national contract and with the national contract - Evans national contract may lapse by the time the Government procures the consoles. Can we make the design of the consoles in the event of the Evans contract lapsing an optional item or maybe leave this out and we mod the contract in the event the Evan's contract lapses. I just don't want to pay for two designs if we don't have to. Jon Ikeda thought that this is a two year contract with options. Maybe Joe can figure out if the contract would lapse prior to our design completing and construction award. On page 27 paragraph 5, no reference on security setback distance to AOA and what happens if we don't get the correct amount of setback. Don't we only have to do the blast analysis and the blast hardening if we don't get the right setback on the AOA? Is the AOA considered public access?	Changes made 1/17/12.

	Do you need to include potential future scope to be included to support construction? Not sure if you need to include this now.	
2) Jon Ikeda	1. Add paragraph numbers for the A/E evaluation etc.. This may be difficult since it is combined with the SOW. It will also make it easier during evaluations and out briefs, or weighting criteria. 2. Weighting criteria for selection. 3. Include Pdf of standard designs 4. Permitting: FAA cannot pay for building permit, ie fee for the review per CFR. I will attach letter that I used for LAS. It was reviewed by FAA Legal. 5. Site Investigations: You may want to consider potholing around the site. I don't recall how developed it is. 6. Site investigations: The SOW mentions soil consolidation swell testing. Is there a concern over expansive soils? If so, please let me discuss with your team some experiences I have had in DEN. 7. You have referenced 1600.69? as a requirement. This may be an issue since it is FOUO.	Changes incorporated 1/17/12.
3) Jon Ikeda/Zane Edwards	The national contract includes design, fabrication and installation. All the GCs need to do is provide access to Evans to come and take the final measurements once the cab is constructed.	Changes incorporated.
4) Scott Earl	Restricted which resources could be sub-contracted	Changes made 2/1/12
5) Kent Freeman	Changed wording on requirement for under slab venting.	Changes made 2/1/12
6) Vance Whitesel	• Structural Section, Note 10 there is a reference to TRACON that should be changed to Base Building. (Page 28) • Mechanical section, Note 2 states the A&E will look into Geothermal. This should be dropped with the contaminated ground water. (Page 29) • Page 33 sites LAS at the bottom of the page. (Section 11, paragraph b) • It would be a good idea to include the furniture design based on the same Unicor style	References to TRACON removed. Geothermal should still be considered but will be eliminated if it is not in the best interest of the government to pursue. LAS reference removed UNICOR used at PSP added.

	used at Palm Springs. This needs to be done at some point and putting it up front will force the A&E to include the furniture considerations in the electrical and network designs for outlet locations, etc.	